

**SAUGET AREA 2 SUPERFUND SITE  
PROPOSED PLAN OU1  
ST. CLAIR COUNTY, ILLINOIS**

**Community Participation**

EPA and Illinois EPA provide information regarding the Sauget Area 2 Superfund Site through public meetings, the Administrative Record for the Site, and announcements published in the *Belleville News-Democrat*. EPA and Illinois EPA encourage the public to gain a more comprehensive understanding of the Site and the Superfund activities that have been conducted at the Site. Additional information can also be found at EPA Region 5's website located at [www.epa.gov/region05/cleanup/saugetarea2](http://www.epa.gov/region05/cleanup/saugetarea2).

The Administrative Record, which contains the information used to develop the Site remedy, is at the following location:

**Public Library**  
Cahokia Public Library  
140 Cahokia Park Drive  
Cahokia, Illinois

**The public comment period will run for a total of thirty days and be from June 7, 2013 to July 8, 2013** and the EPA will be accepting written comments on the Proposed Plan during the public comment period. Written comments can be sent to the following address:

Patricia Krause  
Community Involvement Coordinator  
United States Environmental Protection Agency  
Mail Code SI-7J  
77 W. Jackson Blvd. Chicago, IL 60604

A **public meeting** will be held on June 12, 2013 to discuss all the alternatives and the preferred remedy. Written and oral comments will be accepted at the meeting. The meeting will be held at the following location:

**June 12, 2013  
6:30 PM to 8:00 PM  
Cahokia Village Hall  
103 Main Street, Cahokia, IL**

This Proposed Plan provides a description of the Sauget Area 2 Site ("Site") and summarizes all clean-up activities already completed to date by the United States Environmental Protection Agency (EPA) and potentially responsible parties (PRPs) for the Site. It also identifies the Preferred Remedial Alternative ("Preferred Alternative") for cleaning up the soil and groundwater source contamination at the Site and provides the rationale for this preference. In addition, this Proposed Plan includes summaries of other clean-up alternatives evaluated for use at this Site.

As explained further in this document, this Proposed Plan, and the alternatives discussed, relate only to soil and groundwater source contamination existing on the Sauget Area 2 Site. EPA will propose a separate plan to address groundwater contamination in the Sauget area after remedies are chosen for the soil and groundwater contamination source areas discussed in this Proposed Plan, and those already proposed in the Proposed Plan for soil and groundwater source areas at the Sauget Area 1 Superfund Site.

This document is issued by EPA, the lead agency for Site activities, and the Illinois Environmental Protection Agency (Illinois EPA), the support agency. Following issuance of this Proposed Plan, and after considering any and all public comments received during the 30-day public comment period, EPA, in consultation with Illinois EPA, will select a final remedy for the soil and groundwater source contamination existing on the Sauget Area 2 Site. This final remedy will be presented in a document called a Record of Decision (ROD). EPA, in consultation with Illinois EPA, may modify the Preferred Alternative or select another response action

presented in this Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all of the alternatives presented in this Proposed Plan.

EPA is issuing this Proposed Plan in accordance with Section 117 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), which requires the issuance of decision documents for remedial actions taken pursuant to Sections 104, 106, 120, and 122. This Proposed Plan is also part of EPA's public participation responsibilities under 40 CFR § 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The Proposed Plan summarizes information that can be found in greater detail in the Remedial Investigation (RI) and Feasibility Study (FS) reports and other documents contained in the Administrative Record file for this Site.

EPA and the State encourage the public to review these documents to gain a more comprehensive understanding of the Site and the Superfund activities that have been conducted at the Site to date.

## I. SITE HISTORY

The Sauget Area 2 Site covers approximately 312 acres and is located within the corporate boundaries of Cahokia, East St. Louis, and Sauget, Illinois, in the floodplain bordering the eastern edge of the Mississippi River. Figure 1 shows the location of the Sauget Area 2 Sites.

The Sauget Area 2 Site as a whole consists of five inactive disposal areas (Sites O, P, Q, R and S) described in Table 1 below. Of these disposal sites, three are closed landfills (Sites P, Q and R), one consists of four closed sludge lagoons (Site O), and one is a waste disposal site (Site S) associated with an abandoned solvent reclamation facility (See Figure 2). The locations and acreage of each site are shown in the table below.

**Table 1: Descriptions of Sauget Area 2 Disposal Areas**

Site Name	Size (acres)	Location	Description
Site O	28	Sauget, Illinois	Located on Mobile Avenue, northeast of the American Bottoms Regional Wastewater Treatment Facility (ABRTF) and east of the flood control levee.
Site P	32	East St. Louis and Sauget, Illinois	Bounded by Illinois Central Gulf Railroad tracks, the Terminal Railroad Association tracks and Monsanto Avenue.
Site Q - northern portion	52	Sauget and Cahokia, Illinois	The northern portion of Site Q is bordered on the north by Site R and Monsanto Avenue; on the south by the main track of the Alton and Southern Railroad; on the east by the flood control levee; and on the west by the Mississippi River. The northern portion of Site Q that wraps around the eastern boundary of Site R is

			known as the “dogleg” portion of Site Q.
Site Q – central	67	Sauget and Cahokia, Illinois	The central portion of Site Q is bordered on the north by Q north; on the south by the Alton and Southern Railroad; on the east by the flood control levee and the Illinois Central Gulf Railroad; and on the west by the Mississippi River.
Site Q – southern portion	87	Sauget and Cahokia, Illinois	The southern portion of Site Q is bordered on the north by the Alton and Southern Railroad; on the south by Cargill Road; on the east by the flood control levee and the Illinois Central Gulf Railroad; and on the west by a 10-foot wide easement owned by Union Electric for transmission lines and a spur track of the Alton and Southern Railroad.
Site R	36	Sauget, Illinois	Site R is bounded on the north by Monsanto Avenue; on the east by the dogleg portion of Site Q; on the south by the main portion of Site Q; and on the west by the Mississippi River. The address for the site is 5 Riverview Avenue.
Site S	<1	Sauget, Illinois	Site S is less than one acre in size and is located southwest of Site O.

A brief description of the disposal and contaminant history for each of the sites is discussed below.

Site O - In 1952, the Village of Sauget began operating a wastewater treatment plant in the area now referred to as Site O. In addition to providing treatment for the Village of Sauget, the plant treated effluent from a number of Sauget industries. In 1965, the four lagoons which comprise Site O were constructed at the site. Between approximately 1966 and 1978, the lagoons were used to dispose of clarifier sludge from the Village of Sauget wastewater treatment plant (WWTP). The lagoons were initially identified as Site O during an investigation conducted by Illinois EPA in the 1980s (URS, 2002a). The area known as Site O North was identified during review of aerial photographs and was subsequently determined to be the location of pits associated with operation of the Village of Sauget WWTP. Based on the aerial photographs, Site O South appeared to be associated with a breach in the dike of the sludge lagoons.

In 1980, the Village of Sauget closed the four sludge lagoons by stabilizing the sludge with lime and covering it with approximately 2 feet of clean, low-permeability soil. Currently, the lagoons are vegetated with grass, brush, bushes, and trees.

Site P - Disposal Site P was operated by Sauget and Company from 1973 to approximately 1984. It was an Illinois EPA-permitted landfill and was used for municipal and industrial

waste disposal. Some of the general industrial wastes accepted at Site P included diatomaceous-earth filter cake from the Edwin Cooper Company and non-chemical waste from Monsanto. Site P is currently inactive and for the most part covered, and access to the site is unrestricted. A nightclub and asphalt parking lot occupy three acres in the southeast corner of the site.

Site Q - Between the 1950s and the 1970s, Site Q operated as a landfill that accepted municipal waste, septic tank pumpings, drums, organic and inorganic wastes, solvents, pesticides, paint sludges, plant trash, waste from industrial facilities, and demolition debris. Disposal at Site Q occurred both on the surface and subsurface. Due to its large size and varied disposal history, Site Q was divided into sections based on the nature and extent of contamination and the anticipated remedial actions that would be recommended at the site. Site Q sub-areas are described as follows and presented in Figure 2:

- Site Q Dogleg- The northern portion of Site Q North due east of Site R, bounded on the north and south by extensions of the Site R north and south boundaries.
- Site Q North- The northern portion of Site Q minus Site Q Dogleg.
- Site Q Central- The central portion of Site Q.
- Site Q South- The portion of Site Q south of the Alton & Southern Railroad

Currently site usage includes a roadway, Pitzman Avenue, and a supply terminal along Site Q Dogleg and part of Site Q North. Site Q North and Q Central house a barge terminal facility and five ethanol storage tanks are located on the site. Site Q South is predominantly vacant open land. Access to parts of Site Q Dogleg, and Sites Q North and Q Central is restricted by fences, access to Site Q South is unrestricted.

Site R - Industrial Salvage and Disposal Inc. operated the River's Edge Landfill, now called Site R, for Monsanto from 1957 to 1977. Hazardous and non-hazardous bulk liquid and solid chemical wastes and drummed chemical wastes from Monsanto's W.G. Krummrich plant and, to a lesser degree its Queeny plant in St. Louis, were disposed of at the site. Disposal began in the northern portion of the site and expanded southward. Wastes contained toluene, xylenes, PAHs, chlorobenzenes, chlorophenols, PCP, chloroanilines, phenols, aromatic nitro compounds, aromatic amines, aromatic nitro amines, chlorinated aromatic hydrocarbons, aromatic and aliphatic carboxylic acids and condensation products of these compounds. In 1979, pursuant to a negotiated agreement with Illinois EPA and Monsanto, Monsanto completed the installation of a clay cover on Site R to cover waste, limit infiltration through the landfill, and prevent direct contact with fill material. The cover's thickness ranges from 2 feet to approximately 8 feet. Access to Site R is restricted by a perimeter fence surrounding the site and is monitored by Solutia plant personnel (URS, April 2002b).

Site S - In the mid-1960s, wastes from the former Clayton Chemical property were disposed of in a shallow, on-site excavation which is now designated as disposal Site S. The wastes

were from the solvent recovery process at Clayton which involved steam-stripping. Still bottoms from the stripping process were disposed of at the site.

Heavy industry has been present on the east bank of the Mississippi River between Cahokia and Alton, Illinois, for nearly a century. Industrial activity in the area peaked in the 1960s. Although many industrial facilities have closed down throughout the American Bottoms floodplain, Sauget Area 2 and the surrounding area is still highly industrialized. Currently, the area is used for industry, warehousing, bulk storage, wastewater treatment, hazardous waste treatment, waste recycling, and truck terminals. In addition to heavy industry, the area also has commercial facilities, bars, nightclubs, convenience stores, and restaurants. A number of petroleum, petroleum product, and natural gas pipelines are located in the area.

No residential land use is located immediately adjacent to or downgradient of Sites O, P, Q, R and S and other industrial facilities in Sauget Area 2. Residential areas of Sauget and East St. Louis are separated from Sauget Area 2 by other industries or by undeveloped tracts of land. Limited residential areas exist approximately 3,000 feet to the northeast and southeast of the site. According to the 2010 census, the population of the Village of Sauget, which is where the majority of the Sauget Area 2 site is located, is 159.

In the past, groundwater from the American Bottoms aquifer was a major source of water for the area and was used for industrial, non-potable public, and irrigation purposes. Groundwater levels prior to industrial and urban development were near land surface. Intensive industrial withdrawal, along with the use and construction of a system of drainage ditches, levees, and canals to protect developed areas, lowered the groundwater elevation for many years. By the mid-1980s, however, the groundwater levels had increased due to reduced pumping, high river stages, and high precipitation. Currently, no groundwater is being pumped from the American Bottoms aquifer in the vicinity of Sauget Area 2 for public, private or industrial supply purposes.

Groundwater is not a source of drinking water in the area. The Village of Sauget and the City of East St. Louis have issued ordinances prohibiting the use of groundwater as a potable water source. These ordinances were issued in response to historic industrial land use in the region and resulting groundwater quality impairments. The Village of Cahokia has an ordinance that restricts groundwater use in part of the municipality, but it does not cover the portion of the Sauget Area 2 site that is located in Cahokia. Groundwater use restrictions will likely remain in place for the foreseeable future due to the extent of the groundwater quality impairments.

The source of drinking water for area residents is an intake in the Mississippi River. This intake is located at River Mile 181, approximately three miles north and upgradient of Sauget Area 2. The drinking water intake is owned and operated by the Illinois American Water Company (IAWC) of East St. Louis, and it serves the majority of residences in the area. IAWC supplies water to Sauget and also to portions of Cahokia and Centerville Township. Public water supply is the exclusive potable water source in the vicinity of the Sauget Area 2 site.

The Mississippi River is the major surface water body draining the area. The stretch of the river adjacent to Site R is bounded by steep embankments lined with rip-rap. A few scattered structures in the river, such as a wing dam and a sunken barge, offer some access points for aquatic birds and mammals and potential protection for fish. In the vicinity of Site R, no bordering wetlands, appreciable bordering vegetation, or submerged or emergent vegetation are present. Recreational and commercial fishing does occur in the Mississippi River; however, no fishing access is available along the Site R border. The Sauget Area 2 property is used as habitat by at least six threatened and endangered species, including the federally threatened bald eagle and state endangered snowy egret and little blue heron.

Future land use for the Sauget Area 2 Site and surrounding areas are anticipated to be similar to current land use, which is industrial and commercial.

## **II. CLEAN-UP AND INVESTIGATIVE ACTIVITIES TO DATE**

A number of initial response actions have been taken at three of the five sites (Sites O, Q, and R) that comprise the Sauget Area 2 Site. No action has been taken at Site P or Site S. Initial response actions taken at Sites O, Q, and R are summarized below:

### Site O

In 1980, the Village of Sauget closed the four lagoons that comprise Site O by stabilizing the sludge with lime and covering it with approximately two feet of soil. The construction of the cover was not overseen or approved by either EPA or Illinois EPA. Currently, the former lagoons are vegetated with grass, brush, bushes, and trees.

### Site Q

In 1993, Site Q was flooded and river currents unearthed a number of barrels containing hazardous waste. EPA conducted a removal action in the northern portion of Site Q in 1995 to stabilize the area scoured by the flood waters. On October 18, 1999, EPA initiated a second removal action at Site Q. EPA excavated site waste from eight different areas on the 25-acre southern portion of Site Q. The excavations were primarily focused on two former ponds in the southeast corner of Site Q. Two waste streams were developed based on analytical results of the waste piles: a low-level waste stream with soil concentrations less than 50 parts per million (ppm) of PCBs and a high-level waste stream with soil concentrations greater than 50 ppm of PCBs. Approximately 17,032 tons of waste, comprised of about 20 percent low-level waste and 80 percent high-level waste, were shipped off-site for disposal. In addition, 3,271 drums were removed and disposed. This second removal action was completed on April 5, 2000.

### Site R

Pursuant to a negotiated agreement with the State of Illinois, Monsanto installed a clay cover on Site R in 1979 to cover the waste, limit surface water infiltration through the landfill, and prevent direct contact with the landfill material. The cover thickness ranges from 2 feet to approximately 8 feet. In 1985, Monsanto installed a 2,250 foot long rock revetment along the east bank of the Mississippi River downgradient of Site R. The purpose of the stabilization project was to prevent further erosion of the riverbank and thereby minimize potential for the release of waste material from the landfill. During a flood in

1993, Site R was flooded but the clay cap was not overtopped. No erosion of the Site R riverbank or cap resulted from this flood.

In 2000, EPA entered into an Administrative Order on Consent (AOC) with the PRPs to conduct a remedial investigation/feasibility study (RI/FS) at the five waste disposal sites (O,P,Q,R, and S) to investigate and assess what cleanup remained to be done for the Site after the above referenced actions were completed. RI activities were conducted from June 2002 through October 2002, under the AOC and with EPA and Illinois EPA oversight. A draft RI/FS report was submitted by the PRPs to EPA in 2004. Upon EPA's review of the draft RI/FS report, it was determined supplemental investigation work was necessary to fill data gaps. The supplemental investigation work consisted of the following: supplemental field investigations, installation of monitoring well clusters, non-aqueous phase liquids (NAPL<sup>1</sup>) investigation, vapor intrusion investigation, principal threat waste investigation, and completion of a regional fate and transport groundwater model to fill data gaps in the RI/FS. During the RI and supplemental investigations from 2002 through 2007, the PRPs conducted extensive site investigations of the disposal areas, groundwater, surface water, air, waste, and soil.

EPA evaluated results of these investigation studies in the Final FS Report for Sauget Area 2 (May 2013).

Additionally, during this time period, EPA determined that an interim response action was necessary to address on-going releases into the Mississippi River. In September 2002, EPA signed an interim ROD for Sauget Area 2, operable unit 2 (OU2) and accompanying Unilateral Administrative Order to implement an interim groundwater remedy to address the "release of contaminated groundwater into the Mississippi River at the Sauget Area 2 site in the vicinity of disposal Site R". Physical construction of the remedial action began in August 2003 and was completed in November 2005.

The selected interim remedy was chosen because it would greatly reduce the environmental impacts associated with the release of contaminated groundwater to the Mississippi River from the Sauget Area Sites and in the vicinity of Site R. This was to be accomplished through the containment and extraction of contaminated groundwater downgradient of Site R, thereby reducing mass loading to the Mississippi River. Reduction of mass loading would abate aquatic organism exposure to impacted groundwater, contamination of ecosystems, and sediment toxicity.

The major components of the interim groundwater remedy include the following, subject to several EPA-approved changes over the last eight years to optimize the construction and operation of the barrier wall and pumping system:

- **Physical Barrier** - A 3,500 foot long, "U"-shaped, fully penetrating, bentonite slurry<sup>2</sup> barrier wall installed between the downgradient boundary of Sauget

---

<sup>1</sup> NAPLs are "non-aqueous liquids" that do not mix readily with water and therefore flow separately from ground water, acting as a continual source of groundwater contamination until they are removed or dissipate.. Many contaminants, including chlorinated solvents and petroleum products, enter the subsurface in the form of an oily liquid, known as a NAPL.

<sup>2</sup> In July 2003, EPA signed an Explanation of Significant Differences (ESD) to modify the OU2 interim remedy. The ESD documented that a conventional soil-bentonite slurry barrier wall would be constructed instead of a jet grouted barrier wall. This change did not affect the overall scope of the interim remedy.

Area 2 Site R and the Mississippi River to abate the release of impacted groundwater. The barrier wall was installed to the top of the bedrock surface (approximately 120 to 140 feet deep). The purpose of the barrier wall is to minimize the volume of groundwater that needs to be extracted;

- **Groundwater Extraction** - Three partially penetrating groundwater recovery wells inside the "U"-shaped barrier wall to abate groundwater moving to the wall;
- **Groundwater Treatment** - Once extracted, the contaminated groundwater is treated at the American Bottoms Regional Wastewater Treatment Facility (ABRTF) prior to being discharged to the Mississippi River. ABRTF provides primary treatment as well as secondary biological treatment enhanced by powdered activated carbon;
- **Groundwater Quality Monitoring** - Groundwater samples from wells located between the barrier wall and the river are collected periodically. Concentrations of key compounds are plotted over time to determine and track long-term trends;
- **Groundwater Level Monitoring** - Groundwater level monitoring is performed to ensure acceptable performance of the physical barrier;
- **Surface Water Monitoring** - Surface water samples are collected in the plume release area to determine the effect of any contaminants migrating through, past or beneath the barrier wall and being released to the Mississippi River; and
- **Institutional Controls** - Institutional controls are used to limit fishing in the plume release area. Access to the Mississippi River in the plume release area is limited by existing fencing at Site R, a very steep riverbank and the absence of public roads leading to this area.

The interim ROD further stated that the gradient control achieved by the remedy would be determined by comparing water level elevations in pairs of fully penetrating piezometers that would be installed on both the inside and outside of the barrier wall. However, after startup, it was determined that the appropriate operational control is to use the upgradient hydraulic gradients to determine the appropriate pumping rates. This allows the groundwater remediation system to meet its objective of pumping out the amount of groundwater that naturally flows into the barrier wall. The appropriate operational parameters were optimized and verified through a series of Interim Operational Periods overseen by EPA.

### III. COMMUNITY INVOLVEMENT ACTIVITIES TO DATE

In 1990, EPA developed a Community Involvement Plan (CIP) for the Sauget Area 1 and Area 2 Sites. The CIP is a required document that EPA uses to address community concerns and expectations, as learned from community interviews. The Sauget CIP shares details about the background and history of the Site, clean-up progress, community profile, past

community involvement efforts, key community concerns, how EPA will respond to the community's concerns, the information tools that will be used (such as the web), and information repositories. The CIP also contains a contacts list of current federal, State, and local officials, information repositories, interested groups, and media contacts.

In order to update the information in the 1990 Community Involvement Plan, EPA conducted community interviews in April 2000 and then again in 2009, to assess how much the community knew about the Sites, get area residents' and local officials' concerns about the Sites, and determine what information they wanted EPA to provide them and the best way to disseminate information. The results of those interviews were used to produce the revised 2009 CIP for the Sauget Area 1 and Area 2 Sites. The CIP's background and history timeline are helpful tools in sharing information and the updated contacts lists are used to set up meeting locations and contacts for meetings.

EPA has taken an active role in informing the public of its activities in the Sauget Area Sites through public meetings and fact sheets. To keep current with documents in the Administrative Record, an updated CD is sent to the information repository at the Cahokia Public Library when any new document is added to the Administrative Record.

#### **IV. SITE CHARACTERISTICS**

The Sauget Area 2 Site is situated in a floodplain of the Mississippi River called the American Bottoms. More specifically, it is situated south of East St. Louis along the eastern bank of the Mississippi River. The stratigraphy beneath the Site is much like that of the rest of the floodplain. The Cahokia Alluvium is approximately 40 to 50 feet thick and exists as a fine silty sand that is gray and brown in color. Below this, the unconsolidated deposits of the Henry Formation are present.

Locally, the Henry Formation is characterized by medium-to-coarse sand that becomes coarser and more permeable with depth. The depth to bedrock (below ground surface) ranges from 140 feet near the river and Sauget Area 2 Sites to about 100 feet on the east side of the Sauget Area 1 Site. The ground-water level is currently between 20 to 40 feet below ground surface, but fluctuates considerably throughout the year. Figure 3 presents a generalized geologic cross-section.

Three distinct hydrogeologic units are present in the Sauget Area 2 and Area 1 Sites: 1) a shallow hydrogeologic unit (SHU); 2) a middle hydrogeologic unit (MHU), and 3) a deep hydrogeologic unit (DHU). The 30 foot thick SHU includes the Cahokia Alluvium and the uppermost portion of the Henry Formation. This unit is primarily unconsolidated, fine-grained silty sand with low to moderate permeability. The 40 foot thick MHU is formed by the upper to middle, medium to coarse sand portions of the Henry Formation. It contains a higher permeability sand than found in the overlying shallow hydrogeologic unit, and these sands become coarser with depth. At the bottom of the aquifer is the DHU, which includes the high permeability, coarse-grained deposits of the lower Henry Formation. This zone is estimated to be about 30 to 40 feet thick. Groundwater beneath Sauget Area 2 generally flows from east to west, toward the Mississippi River.

The RI investigated contaminants in various environmental media, including surface soil, subsurface soil, waste, groundwater, air, surface water, and sediments. The identified contaminant source areas at the Sauget Area 2 Site are the five inactive disposal areas: Sites

O, P, Q, R and S. These disposal areas contain municipal and industrial waste materials. The lower portion of waste at these Sites is below the water table.

During the RI, a regional groundwater flow and contaminant transport (fate and transport) model was developed covering the southern portion of the American Bottoms aquifer. The fate and transport model was used to simulate the movement of groundwater plumes from the source zones. Simulations started in the 1950 to 1960 time period and were adjusted to match observed groundwater plumes in 2005/2006. Chlorobenzene was used as a key constituent in the model and key features of the existing chlorobenzene plume were matched with the model. These features included: 1) higher observed concentrations associated with the W.G. Krummrich Facility, Sauget Area 1 Site, Sauget Area 2 Site, Clayton Chemical source zones; 2) a portion of the Deep Hydrogeologic Unit (DHU) chlorobenzene dissolved plume extending to the northern portion of Site P, north of the main source zone; and 3) the Site R plume and portions of other plumes being captured by the GMCS. The Regional Groundwater Fate and Transport Model is discussed in further detail and appended to the RI Report (URS, 2008).

Wastes present on Site were also evaluated during the RI to determine whether any should be treated as “principal threat wastes”<sup>3</sup> for the Site. Based on the information gathered during the principal threat investigation, EPA found no evidence of large quantities of drums containing liquid wastes or highly mobile source material at the Sauget Area 2 Sites. However, small quantities of principal threat wastes identified as NAPL were observed in the following locations: Site P, NAPL observed in Anomaly Trench AT-P-4 and LEACH P-1; Site Q North, NAPL observed at Sonic-5 and LEACH-Q-1; Site Q South, two intact drums were found where potential NAPL leaked into the trench from the drums; and Site R, NAPL was observed at eight locations around the perimeter of Site R. No principal waste threat materials were identified at Site O.

## **V. SCOPE AND ROLE OF THE ACTION**

The action proposed in this Plan, referred to as remedial action for Operable Unit 1 (OU 1), will be the first of two remedial decisions and remedial actions for the Sauget Area 2 Site. EPA’s overall strategy for cleaning up the Site is to address soil and groundwater source contamination through this remedial action for OU1, which will be the final remedy for contaminated soils and groundwater source at the Site. Area-wide groundwater contamination resulting from the contaminated soil and groundwater source areas present in the Sauget Area 1 and Sauget Area 2 Sites will be addressed as a separate OU, which will be proposed and set forth in a separate groundwater ROD for the Sauget Area 1 and Sauget Area 2 Sites.

## **VI. SUMMARY OF SITE RISKS**

Throughout the remedial investigation studies, two human health risk assessments (HHRAs) have been conducted by the PRPs, with EPA oversight, for the Sauget Area 2 Site, the Site-wide HHRA (2009) and the Vapor Intrusion HHRA (2009). The PRPs completed

---

<sup>3</sup> Principal threat wastes are those source materials that are considered to be highly toxic or highly mobile that cannot be reliably contained or would present a significant threat to human health or the environment should exposure occur. They include liquids and other highly mobile materials or materials having high concentrations of toxic compounds.

these site-specific risk assessments, as required by EPA's 2000 RI/FS AOC signed by the PRPs, for the purpose of quantifying the potential threat to public health and the environment from actual or threatened releases of hazardous substances into the environment. The HHRA's were prepared using EPA's Risk Assessment Guidance for Superfund (RAGS) and evaluated potential current and future exposure scenarios at the Site.

#### **A. Human Health Risks**

To estimate the risk to human health at a Superfund site (i.e., the likelihood of health problems occurring if no cleanup action is taken at a site), EPA guidance outlines a four-step process:

Step 1: Analyze Contamination

Step 2: Estimate Exposure

Step 3: Assess Potential Health Dangers

Step 4: Characterize Potential Site Risk

In Step 1, the risk assessor evaluates the data collected at a particular site to determine which data are appropriate to consider in the risk assessment. Next, the risk assessor looks at the concentrations of contaminants found at a site, as well as past scientific studies on the effects these contaminants have had on people (or animals when human studies are unavailable). Comparisons between site-specific concentrations and concentrations reported in past studies help to determine which contaminants are most likely to pose the greatest threat to human health.

In Step 2, the risk assessor considers the different ways that people might be exposed to the contaminants identified in Step 1, the concentrations that people might be exposed to, and the potential frequency and duration of exposure. Using this information, the risk assessor calculates a reasonable maximum exposure (RME) scenario, which represents the highest level of human exposure that could reasonably be expected to occur.

In Step 3, the risk assessor compiles EPA-endorsed cancer and non-cancer toxicity data for the contaminants posing the greatest potential threat to human health. When human health-based toxicity data are not available, animal-based toxicity data are used, which have safety factors applied to account for the uncertainty in the use of animal-based toxicity values.

In Step 4, the risk assessor uses the information from Step 2 combined with information from Step 3 to assess potential health risks. EPA guidance considers two types of risk: cancer and non-cancer.

The likelihood of one additional lifetime cancer resulting from a Superfund site is generally expressed as an upper-bound probability; for example, a 1 in 10,000 chance. In other words, for every 10,000 people that could be exposed, one additional cancer case may occur as a result of exposure to site contaminants over a lifetime. An additional cancer case means a probability that one more person could get cancer than normally would be expected to from all other causes. This is also referred to as an excess lifetime cancer risk (ELCR) because it

would be in addition to the risks of cancer individuals face from other causes such as smoking or exposure to too much sun. The chance of an individual developing cancer from all other causes has been estimated to be as high as one in three. As noted above, EPA's generally acceptable ELCR range for site-related exposures is 1 in 10,000 to 1 in 1,000,000.

For non-cancer health effects, EPA calculates risk differently. The key concept here is that a threshold level exists below which non-cancer health effects are no longer predicted. This threshold level is conservatively represented by a reference dose (RfD). An RfD represents a level that an individual may be exposed to that is not expected to cause any deleterious effect. Non-cancer risks are calculated as the ratio of potential exposure to the RfD. This ratio is referred to as a hazard quotient (HQ). A HQ of greater than 1 indicates an unacceptable risk for adverse non-cancer health effects from a specific contaminant of concern (COC). An example of a non-cancer health effect would be a decrease in function of a vital organ such as neurological organs, kidneys, liver or reproductive organs. The hazard index (HI) is generated by adding the HQs for all COCs that affect the same target organ (e.g., liver) or that act through the same mechanism of action within a medium or across all media to which a given individual may reasonably be exposed. An HI of 1 or less indicates that, based on the sum of all HQs from different contaminants and exposure routes, toxic noncarcinogenic effects from all contaminants are unlikely. An HI of greater than 1 indicates that site-related exposures may present a risk to human health.

The risk assessor determines whether site risks are great enough to cause health problems for people at or near the Superfund site. The results of the three previous steps are combined, evaluated and summarized. The risk assessor adds up the potential risks from the individual contaminants and exposure pathways and calculates a total site risk.

As noted above, as part of the remedial investigation for the Site, two HHRA's were prepared. The following provides a brief description of the human health risk assessments conducted for the Sauget Area 2 Site:

- **Site-Wide HHRA:** PRPs conducted a site-wide HHRA for the Sauget Area 2 Sites (O,P,Q,R,and S) in 2009 (AECOM, Inc., 2009a).
- **Vapor Intrusion HHRA:** The Vapor Intrusion HHRA was conducted for 13 buildings located onsite in 2009 (AECOM, Inc., 2009b).

To guide identification of appropriate exposure pathways for evaluation in the risk assessments, a conceptual site model for human health was developed to identify source areas (e.g., potential migration pathways of constituents from source areas to environmental media where exposure can occur), as well as potential human receptors (e.g., construction workers, outdoor industrial workers). Potential environmental exposure media include the following:

- Surface soil (0 - 0.5 ft below ground surface (bgs));
- Combined soil (combined surface, subsurface (0.5 – 6 ft bgs and waste));
- Shallow groundwater, mid-groundwater, and leachate;
- Surface water;

- Seeps;
- Sediment;
- Indoor air; and
- Fish Fillet

## **1. Identification of Chemicals of Concern**

The Site characterization data used in the risk assessments was subjected to standard EPA data validation procedures before they were used in the risk assessment. Only data meeting the data validation criteria were used in the risk assessment.

In the first step of the HHRA, chemicals of potential concern (COPCs) in each potential environmental exposure medium were identified using a screening process that began with all of the chemicals detected in the various environmental media. The lists were then refined by eliminating chemicals unlikely to contribute substantially to Site risks.

The chemicals identified as COPCs by this process were carried through the risk assessment process (Steps 2 through 4). Chemicals found to exceed EPA's target risk ELCR or target non-cancer HI were designated as COCs for the Site (in Step 4).

The following COCs were identified for the Sauget Area 2 Sites in Step 4 of the site-wide HHRA:

### Site O

- Surface soil - dioxins for outdoor industrial workers.
- Combined soil - PCBs for construction workers.

### Site O North

- Surface soil - dioxins and PCBs for outdoor industrial workers and trespassing teenagers.
- Combined soil - dioxins and PCBs for construction workers.
- Leachate - PCBs for construction workers.

### Site O South

- ELCR estimates did not exceed EPA's target ELCR range and non-cancer hazards did not exceed EPA's target HI; therefore, no COCs were identified.

### Site P

- Combined soil - PCBs for construction workers.

### Site Q Central

- Surface soil - Dioxins for outdoor industrial workers.

### Site Q North

- Combined soil - Dioxins, PCBs, and lead for construction workers.

- Leachate - 2,4-dichlorophenol, lead, pentachlorophenol, and PCBs for construction workers.

#### Site Q South

- Surface soil - Cadmium and dioxins for outdoor industrial workers.
- Combined soil - Cadmium for construction workers.

#### Site Q South Ponds

- Large Pond fish - Arsenic, benzo(a)pyrene, dieldrin, dioxins, and PCBs for recreational fishermen.
- Small Pond surface water - Benzo(a)pyrene for recreational fishermen and trespassing teenagers.

#### Site R

- Combined soil - Tetrachloroethene and PCBs for construction workers.
- Leachate - The following chemicals for construction workers, outdoor industrial workers, and/or trespassing teenagers:
 

• 1,2,4-trichlorobenzene	• benzene	• manganese
• 1,2-dichloroethane	• benzo(a)pyrene	• MCPA
• 1,2-dichloroethene (total)	• benzo(b)fluoranthene	• naphthalene
• 1,4-dichlorobenzene	• benzo(k)fluoranthene	• PCBs
• 2-methylnaphthalene	• chlorobenzene	• tetrachloroethene
• 2,4-dichlorophenol	• chloroform	• trichloroethene
• 4-chloroaniline	• chloromethane	• toluene
• 4,4'-DDT	• dibenzo(a,h)anthracene	• xylenes
	• dioxins	

#### Site S

- Surface soils - PCBs for outdoor industrial workers and trespassing teenagers.
- Combined soil - PCBs for construction workers.

Information about the detection frequency, range of concentrations detected, and the exposure point concentrations used in the risk assessments for each medium is presented in more detail in the HHRA's.

## **2. Exposure Assessment**

The exposure pathways and receptors considered for evaluation, along with the rationale for their inclusion in, or exclusion from, the quantitative risk assessments are described in the HHRA. Sauget Area 2 Sites have been used for industrial purposes for many years and use of these areas is expected to remain industrial. The sites within Sauget Area 2 are zoned

commercial/industrial and it is likely that the sites will continue to be used well into the reasonably foreseeable future for commercial/industrial purposes. Therefore, the sites were evaluated for commercial/industrial use scenarios in the HHRAs. Receptors were identified for the sites based on the conceptual site model and the COPCs identified in media in the areas. The potential receptor groups considered included:

- Current indoor industrial workers,
- Current indoor adults at PT's Adult Entertainment on Site P,
- Future outdoor industrial workers,
- Future construction/utility workers,
- Future trespassing teenagers, and
- Recreational fishers.

Further discussion of the reasons for including or excluding particular exposure pathways from the quantitative risk assessments can be found in the HHRAs.

### **3. Toxicity Assessment**

Toxicity information used in the HHRAs was derived primarily from EPA's Integrated Risk Information System (IRIS) database. Toxicological information presented in IRIS represents a consensus opinion of EPA health scientists and has undergone peer review (both internal and external). If no information was provided in IRIS for a given chemical, toxicity values were drawn from EPA's National Center for Environmental Assessment, the California Environmental Protection Agency, the U.S. Department of Health and Human Services Agency for Toxic Substances and Disease Registry, and EPA's Health Effects Assessment Summary Tables. Further description of the toxicity assessment process can be found in the HHRAs. Additionally, EPA conducted an evaluation of the updated EPA Reference dose (RfD) for dioxin at the Sauget Area 2 sites. Based on EPA's review of the new RfD concentration for dioxin based on non-cancer effects, the proposed alternatives are protective (CH2M Hill, September 2012).

### **4. Risk Characterization**

As described above, for carcinogens, risks are generally expressed as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to the carcinogen. ELCR was calculated from the following equation:

$$\text{Risk (ELCR)} = \text{LADD} \times \text{SF}$$

where:            risk = a unitless probability (e.g.,  $2 \times 10^{-5}$ ) of an individual developing cancer  
                     LADD = lifetime average daily dose (mg/kg-day)  
                     SF = slope factor, expressed as (mg/kg-day)<sup>-1</sup>

These risks are probabilities that are usually expressed in scientific notation (e.g.,  $1 \times 10^{-6}$ ). An ELCR of  $1 \times 10^{-6}$  indicates that an individual experiencing the reasonable maximum exposure estimate has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure.

The potential for noncarcinogenic effects was evaluated by comparing an exposure level over a specified time period (e.g., 30 years) with a reference dose (RfD) derived for a similar exposure period and calculating the HQ (for an individual chemical) and HI (for multiple chemicals acting on the same target organ). The HQ was calculated as follows:

$$\text{Noncancer HQ} = \text{CADD}/\text{RfD}$$

where: CADD = chronic average daily dose

RfD = reference dose

CADD and RfD are expressed in the same units and represent the same exposure period (i.e., chronic, subchronic, or short-term). The HI was calculated by summing the HQs for chemicals acting on the same target organ.

In the site-wide HHRA and Vapor Intrusion HHRA, cancer risks (expressed as ELCR) and noncancer hazards (expressed as HI) from exposure to contaminated media at the Site were estimated for RME scenarios. The chemicals exceeding EPA-acceptable ELCR or HI levels were designated as COCs in the environmental media; the COCs, ELCR estimates (expressed as one significant figure) and HI estimates (expressed as whole numbers above 1) are presented below:

#### Site O

- Risk Estimates:
  - o Outdoor Industrial Worker ELCR=  $3 \times 10^{-4}$  and HI = 7
  - o Construction/Utility Worker ELCR within EPA's acceptable risk range and HI= 3
- Media, COCs, and Exposure Point Concentrations:
  - o Combined Soil - PCBs (42.2 mg/kg)
  - o Surface Soil- Dioxin (0.0067 mg/kg)

#### Site O North

- Risk Estimates:
  - o Outdoor Industrial Worker ELCR=  $2 \times 10^{-3}$  and HI = 75
  - o Construction/Utility Worker ELCR=  $5 \times 10^{-4}$  and HI = 48
  - o Trespassing Teenager ELCR=  $2 \times 10^{-4}$  and HI = 10
- Media, COCs, and Exposure Point Concentrations:
  - o Combined Soil - PCBs (896 mg/kg)
  - o Leachate- PCBs (0.055 mg/L)
  - o Surface Soil- PCBs (709 mg/kg)
  - o Combined Soil- Dioxin (0.307 mg/kg)
  - o Surface Soil-Dioxin (0.52 mg/kg)

**Site O South-** The potential ELCR and HI are within EPA's acceptable levels. Because there were no exceedences of EPA's target levels, no COCs were identified.

#### Site P

- Risk Estimates:

- Construction worker/Utility Worker ELCR within EPA's acceptable risk range and HI = 2
- Media, COCs, and Exposure Point Concentrations:
  - Combined Soil- PCBs (30.2 mg/kg)
- The Vapor Intrusion HHRA concluded that the ELCR and HI estimates for PT's Adult Entertainment did not exceed EPA's acceptable levels. However, the soil gas testing could not eliminate the possibility of a potentially complete vapor intrusion pathway.

#### Site Q North

- Risk Estimates:
  - Construction worker/Utility Worker ELCR within EPA's acceptable risk range and HI = 11
- Media, COCs, and Exposure Point Concentrations:
  - Combined Soil- Dioxin (0.006 mg/kg), Lead (1,160 mg/kg), PCBs (24.3 mg/kg)
  - Leachate- 2,4-D (140 mg/L), Lead (1.61mg/L), PCBs (0.048 mg/L), Pentachlorophenol (6.30 mg/L)
- The Vapor Intrusion HHRA concluded that the ELCR and HI estimates for the River City Landscape Supply Warehouse did not exceed EPA's acceptable levels. However, the soil gas testing could not eliminate the possibility of a potentially complete vapor intrusion pathway.

#### Site Q Central

- Risk Estimates:
  - Outdoor industrial worker ELCR within EPA's acceptable risk range and HI = 2
- Media, COCs and Exposure Point Concentrations:
  - Surface soil - Dioxin (0.002 mg/kg)

#### Site Q South

- Risk Estimates:
  - Outdoor Industrial Worker ELCR =  $1 \times 10^{-4}$  and HI = 7
  - Construction/Utility Worker ELCR within EPA's acceptable risk range and HI = 4
  - Recreational Fisher at Large Pond (Black Bullhead) ELCR =  $6 \times 10^{-4}$  and HI = 24
  - Recreational Fisher at Large Pond (Carp) ELCR =  $1 \times 10^{-3}$  and HI = 60
  - Trespassing Teenager at Small Pond ELCR =  $2 \times 10^{-4}$  and HI less than EPA's target level
  - Recreational Fisher at Small Pond ELCR =  $3 \times 10^{-4}$  and HI less than EPA's target level
- Media, COCs and Exposure Point Concentrations:
  - Combined Soil- Cadmium (316 mg/kg)
  - Surface Soil- Cadmium (3650 mg/kg), Dioxin (0.0037 mg/kg)

- Large Pond Fish Fillet- Arsenic (0.78 mg/kg), Dieldrin (0.1 mg/kg), Dioxin 0.00000265 mg/kg, PCBs (3.87 mg/kg)
- Small Pond Surface Water- benzo(a)pyrene (0.0046 mg/kg)

## Site R

- Risk Estimates
  - Outdoor Industrial Worker ELCR=  $4 \times 10^{-1}$  and HI = 4700
  - Construction/Utility Worker ELCR=  $9 \times 10^{-2}$  and HI = 11,000
  - Trespassing Teenager ELCR=  $7 \times 10^{-3}$  and HI = 180
- Media, COCs and Exposure Point Concentrations:
  - Combined soil - tetrachloroethene (225 mg/kg) and PCBs (42.7 mg/kg)
  - Leachate- The following chemicals:
 

• 1,2,4-trichlorobenzene	• benzene	• manganese
• 1,2-dichloroethane	• benzo(a)pyrene	• MCPA
• 1,2-dichloroethene (total)	• benzo(b)fluoranthene	• naphthalene
• 1,4-dichlorobenzene	• benzo(k)fluoranthene	• PCBs
• 2-methylnaphthalene	• chlorobenzene	• tetrachloroethene
• 2,4-dichlorophenol	• chloroform	• trichloroethene
• 4-chloroaniline	• chloromethane	• toluene
• 4,4'-DDT	• dibenzo(a,h)anthracene	• xylenes
	• dioxins	

## Site S

- Risk Estimates
  - Outdoor Industrial Worker ELCR=  $1 \times 10^{-3}$  and HI = 66
  - Construction /Utility Worker ELCR within EPA's acceptable risk range and HI= 12
  - Trespassing Teenager ELCR within EPA's acceptable risk range and HI = 8
- Media, COCs and Exposure Point Concentration:
  - Surface soil - PCBs (1,010 mg/kg)
  - Combined Soil- PCBs (15.2 mg/kg)

## B. Summary of Ecological Risk

The PRPs conducted a baseline ecological risk assessment (BERA), with EPA oversight under the RI/FS AOC signed in 2002, to evaluate the potential risks to ecological receptors on a site by site basis. The objective of the BERA was to evaluate the ecological risks to biological receptors living within the aquatic and terrestrial ecosystems located on or adjacent to the Sites, as a result of exposures to Site-related constituents.

Risks to aquatic receptors in the Mississippi River were assessed through the collection of surface water and sediment samples from locations upstream, adjacent to, and downstream of the Sites. The BERA concluded the following: that, while prior to the construction of the

interim remedial action for groundwater, there were some ecological risks associated with the presence of COPECs in Mississippi River surface water, after construction, there were no adverse ecological impacts associated with the presence of contaminants of potential ecological concern (COPECs) in Mississippi River sediments adjacent to or downstream of the Sites. There BERA found that the risks posed by COPECs have been mitigated by the installation of the groundwater barrier wall.

The BERA identified risks associated with COPECs in surface soil found throughout the Sauget Area 2 Sites and concluded that ecological risks to herbivores and carnivores from exposure to dioxins/furans are present at Site O and Site Q South. Sites O (vole and fox) and Q (fox only) were considered to pose risks to mammals from exposure to dioxins/furans in the floodplain.

### **C. Summary of Areas with Potential Risks**

Areas of potential human health risks were identified at each Site by reviewing the COCs defined for soil under the RME scenario and evaluating data based on a risk benchmark of  $10^{-4}$  and HI of 1. The areas on each individual Site where the HHRA concluded that potential human health risk exists are depicted on Figures 2-1 through 2-7 of the FS (May 2013). Ecological areas of concern at the various Sites were evaluated in a similar manner and areas of potential ecological risk for Site O and Site Q South are shown on Figure 2-1 and 2-5 of the FS (May 2013), respectively.

A vapor intrusion evaluation was performed to evaluate whether volatile and semi-volatile organic constituents (VOCs and SVOCs) detected in the subsurface air at the SA2 Sites have the potential to pose risks above EPA's target risk levels assuming commercial/industrial exposure to indoor air via the inhalation pathway. The evaluation included the collection of soil gas samples from 13 buildings at the SA2 Sites. Only buildings with a potentially complete vapor intrusion were evaluated. No buildings with potentially complete vapor intrusion pathways were identified in Sites O, Q South, or R. Potentially complete vapor intrusion pathways were identified for the RCLS Warehouse building located on Site Q North and PT's Adult Entertainment building located on Site P.

Based on these evaluations, areas within each individual Site where remedial action is necessary were identified and Site specific RAOs were then developed for each individual Site.

## **VII. REMEDIAL ACTION OBJECTIVES**

It is EPA's judgment that the preferred alternative identified in this Proposed Plan is necessary to protect public health, welfare, or the environment from actual or threatened releases of hazardous substances into the environment by meeting the remedial action objectives.

Remedial Action Objectives (RAOs) are general descriptions of the goals established for protecting human health and the environment, to be accomplished through remedial actions. RAOs normally identify the medium of concern, COPCs, EPA acceptable risk levels, potential exposure routes, and potential receptors.

The RAOs for the SA2 sites were formulated based on environmental concerns defined in the RI, HHRA and the BERA and reflect the reasonably anticipated future land use at the SA2 sites. The use of groundwater as a drinking water source in the vicinity of the SA2 sites is prohibited by local ordinances; therefore the HHRA evaluated only the potential incidental exposure to groundwater (i.e., non-drinking water scenarios) including contact by a construction/utility worker performing excavation in the area or volatilization through the soil in column resulting in exposure to chemicals of concern in indoor or outdoor air.

For the purpose of evaluating the remedial action alternatives for soil and waste areas, the potentially mobile source material and principal threat waste identified above the water table was addressed as soil or waste. Potentially mobile source material and principal threat waste identified on or below the water table will be addressed through a separate groundwater action. Therefore, no specific RAOs were developed for soils potentially leaching to groundwater. Any potential impacts to groundwater resulting from the soils leaching to groundwater will be addressed by the specific RAOs and ARARs developed for the groundwater operable unit and addressed in separate action.

The following RAOs have been identified for the Sauget Area 2 Site based on the potential receptor risks and hazards for the exposure scenarios presented in the risk assessments.

#### **Site O**

- Prevent human exposure to COCs in surface and near-surface wastes and soils at levels causing unacceptable risk due to future construction/utility work or industrial/commercial uses.
- Minimize current and future migration of COCs from soil and waste to groundwater at levels causing unacceptable risks.
- Prevent ecological exposure to COCs in surface soils at levels causing unacceptable risk to the environment.
- Minimize migration of mobile source material.

#### **Site P**

- Prevent human exposure to COCs in surface and near-surface wastes and soils at levels causing unacceptable risk due to future construction/utility work or industrial/commercial uses.
- Prevent human exposure to vapor intrusion into indoor air at levels that result in unacceptable risk from COCs in waste materials, soils or groundwater.
- Minimize current and future migration of COCs from soil and waste to groundwater at levels causing unacceptable risks.
- Minimize migration of principal threat/ mobile source material.

#### **Site Q North**

- Prevent human exposure to COCs in surface and near-surface wastes and soils at levels causing unacceptable risk due to future construction/utility work or industrial/commercial uses.
- Minimize current and future migration of COCs from soils and waste to groundwater at levels causing unacceptable risks.
- Minimize the potential for releases of COCs in wastes and soils due to bank erosion and Mississippi River flooding.
- Minimize migration of principal threat/mobile source material.
- Prevent human exposure to vapor intrusion into indoor air at levels that result in unacceptable risk from COCs in waste materials, soils, or groundwater.

#### **Site Q Central**

- Prevent human exposure to COCs in surface and near-surface wastes and soils at levels causing unacceptable risk due to future construction/utility work or industrial/commercial uses.
- Minimize current and future migration of COCs from soils and waste to groundwater at levels causing unacceptable risks.
- Minimize the potential for releases of COCs in wastes and soils due to bank erosion and Mississippi River flooding.
- Minimize migration of principal threat/mobile source material.
- Prevent human exposure to vapor intrusion into indoor air in potential future buildings at levels that result in unacceptable risk from COCs in waste materials, soils, or groundwater.

#### **Site Q South**

- Prevent human exposure to COCs in surface and near-surface wastes and soils at levels causing unacceptable risk due to future construction/utility work or industrial/commercial uses.
- Minimize current and future migration of COCs from soils and waste to groundwater at levels causing unacceptable risks.
- Minimize the potential for releases of COCs in wastes and soils due to bank erosion and Mississippi River flooding.
- Minimize migration of principal threat/mobile source material.
- Prevent human exposure to vapor intrusion into indoor air in potential future buildings at levels that result in unacceptable risk from COCs in waste materials, soils, or groundwater.

- Prevent unacceptable risk to recreational fisherman resulting from exposure via ingestion of fish caught in the Site Q South ponds.
- Prevent human exposure to particulates in outdoor air at levels that result in unacceptable risk from COCs in waste materials or soils due to future construction activities.
- Prevent ecological exposure to COCs in wastes or soils due to bank erosion and Mississippi River flooding.

#### **Site R**

- Prevent human exposure to COCs in surface and near-surface wastes and soils at levels causing unacceptable risk due to future construction/utility work or industrial commercial uses.
- Minimize the potential for releases of COCs in wastes or soils due to bank erosion and Mississippi River flooding.
- Minimize migration of principal threat/mobile source material.
- Prevent human exposure to vapors released to outdoor air at levels that result in unacceptable risk from COCs in waste materials, soils, or groundwater due to future Site activities or trespassing.
- Prevent human exposure to vapor intrusion into indoor air in potential future buildings at levels that result in unacceptable risk from COCs in waste materials, soils, or groundwater.

#### **Site S**

- Prevent human exposure to COCs in surface and near-surface wastes and soils at levels causing unacceptable risk due to future construction/utility work or industrial/commercial uses.
- Minimize current and future migration of COCs from soil and waste to groundwater at levels causing unacceptable risks.
- Minimize migration of mobile source material.
- Prevent human exposure to vapor intrusion into indoor air in potential future buildings at levels that result in unacceptable risk from COCs in waste materials, soils, or groundwater.

## **VI. DESCRIPTION OF ALTERNATIVES**

The remedial alternatives for the Sauget Area 2 Site are presented below. The alternatives are numbered to correspond with the numbers in the RI/FS Report (May 2013). EPA's presumptive remedy for landfills was used as the basis for developing the remedial alternatives. Section 300.430 (a)(iii)(B) of the NCP states that engineering controls, such as containment, will be used for waste that poses a relatively low long-term threat where

treatment is impractical. Waste in landfills is present in large volumes and is heterogeneous mixture of municipal, industrial and/or hazardous waste. Using the presumptive remedy of containment, the following alternatives were developed.

**Common Elements** - All of the alternatives, except the “no action” require the following common elements:

**Engineered Covers** - Engineered covers minimize the potential for exposure to COCs in soils and waste. The types of engineered covers selected for a remedial alternative will vary depending on the existing uses of the Sites and the types of fill or waste materials that are present there.

The types of engineered covers included in the remedial alternatives for the Sauget Area 2 Sites include RCRA Subtitle C caps, (including 35 Illinois Administrative Code (IAC) 724 impermeable caps, 35 IAC 724 compliant soil caps, and 35 IAC 724 compliant crushed rock caps, 35 IAC 807 caps, and asphalt caps.

Impermeable RCRA Subtitle C caps are multi-layer caps that promote surface water drainage and minimize surface water infiltration. They include a low- permeability layer underlain by a gas collection layer and overlain by a drainage layer and protective soil cover and vegetative layer. At traffic areas, the surface layer of a RCRA Subtitle C cap can be constructed of alternate materials such as crushed rock or asphalt pavement.

A 35 IAC 724 compliant soil or crushed rock cap will meet the performance standards of an impermeable RCRA Subtitle C cap, except the component requiring long-term minimization of migration of liquids where this performance standard is not necessary or appropriate. As discussed further in the section below entitled “Compliance with ARARs”, this is the case with regard to the Sauget Area 2 sites. Therefore, the 35 IAC 724 compliant caps will not include the low-permeability component of the RCRA Subtitle C designed caps. Both the soil and crushed rock caps will use clean material to minimize potential for exposure to COCs in soil and waste. Both caps would require a minimum of two feet of suitable material. Crushed rock caps will use granular material to cover an area. The granular material can be free-draining or less permeable material, depending on site-specific conditions.

35 IAC 807 caps generally consist of 6 inches of soil overlying approximately 18 inches of compacted clay placed over the waste areas.

Asphalt covers include a prepared subgrade, aggregate base, and an asphalt surface layer. The pavement and aggregate base thickness can be tailored to location specific conditions. Asphalt covers require long-term inspection and maintenance to retain their effectiveness reduce surface water infiltration and significantly reduce the potential for exposure to COCs in the covered area.

Details of the engineered cover designs for Sauget Area 2 would be developed during the remedial design process. Specifications would include details regarding the extent that the engineered covers ensure the protectiveness of the caps.

**Institutional Controls** - Institutional controls are designed to control access to the Site, manage construction or other intrusive activities that may disturb soil or waste, minimize potential exposure to COCs, and ensure that groundwater is not used for drinking water

purposes. Institutional controls that could be implemented include deed restrictions, zoning restrictions and access restrictions such as fences or warning signs. At a minimum, institutional controls will be implemented in accordance with the Illinois Uniform Environmental Covenant Act (UECA) to restrict residential development of the Site. Consistent with expectations set out in the Superfund regulations, none of the remedies rely exclusively on institutional controls to achieve protectiveness. A detailed description of the institutional controls for Sauget Area 2 will be developed in an Institutional Controls Implementation Plan to be prepared during the remedial design process.

#### **ALTERNATIVE O1, P1, Q1, R1, and S1**

- **No Action**

*Estimated Capital Cost: \$0*

*Estimated Total O&M Cost: \$0*

*Estimated Present Worth Cost: \$0*

*Estimated Construction Timeframe: None*

Regulations governing the Superfund program require that the “no action” alternative be evaluated to establish a baseline for comparison. Under this alternative, EPA would take no action at the Site to prevent exposure to the soil and groundwater source contamination.

#### **Site O**

##### **Alternative O2:**

- **35 IAC 724 COMPLIANT SOIL COVER OVER IDENTIFIED WASTE AREAS**
- **INSTITUTIONAL AND ACCESS CONTROLS**

*Estimated Capital Cost: \$5,900,000*

*Estimated O&M Present Worth Cost: \$420,000*

*Estimated Present Worth Cost: \$6,300,000*

*Estimated Construction Timeframe: 6 to 9 years*

Institutional controls and engineered covers were described under “Common Elements” above. This alternative includes a 35 IAC 724 compliant soil cover over the identified waste areas and institutional controls. The area to be addressed by this alternative is the area where industrial waste was identified in the RI (URS, 2008a) as shown on Figure 4. It is believed that much of the Site already has a minimum of 2 feet of soil cover. These areas would not require additional soil cover if the pre-design investigation can confirm cover thickness. Areas requiring additional cover in order to meet the 2-foot minimum requirement will be identified during the pre-design investigation.

##### **Alternative O3:**

- **PHYTO-TECHNOLOGY IN POTENTIAL MOBILE SOURCE AREAS**
- **35 IAC 724 COMPLIANT SOIL COVER OVER REMAINDER OF IDENTIFIED WASTE AREAS**
- **INSTITUTIONAL AND ACCESS CONTROLS**

*Estimated Capital Cost: \$5,400,000*

*Estimated Present Worth O&M Cost: \$400,000*

*Estimated Present Worth Cost: \$5,800,000*

*Estimated Construction Timeframe: 6 to 9 years*

Institutional controls and engineered covers were described under “Common Elements” above. The additional component of Alternative O3 is described below. This alternative includes the components of Alternative O2 above, with phyto-technology in the potential mobile source areas, as described below.

**Phyto-Technology in Potential Mobile Source Areas** - This process option involves a soil cover and phytotechnology in potential mobile source areas, as shown on Figure 5. Phytotechnology is the use of specially selected plants to provide added benefit in contaminant reduction (i.e. remediation) of selected COCs. It utilizes a variety of plant biological processes and the physical characteristics of plants to aid in Site remediation. Phytotechnology encompasses a number of different processes that can lead to contaminant degradation, removal (through accumulation or dissipation), or immobilization including: degradation, rhizodegradation (enhancement of biodegradation in the below-ground root zone by microorganisms), phytodegradation (contaminant uptake and metabolism above or below ground, within the root, stem, or leaves), phytoextraction (contaminant uptake and accumulation), phytovolatilization (contaminant uptake and volatilization), and phytostabilization (contaminant immobilization in the soil). Phytotechnology enhanced vegetated covers can combine a variety of these methods for containment, removal, and/or destruction of COCs.

**Alternative O4:**

- **RCRA SUBTITLE C DESIGNED COVER OVER IDENTIFIED WASTE AREAS**
- **INSTITUTIONAL AND ACCESS CONTROLS**

*Estimated Capital Cost: \$15,567,663*

*Estimated Present Worth O&M Cost: \$640,821*

*Estimated Present Worth Cost: \$16,208,484*

*Estimated Construction Timeframe: 7 to 11 years*

Institutional controls and engineered covers were described under “Common Elements” above. This alternative includes a RCRA Subtitle C designed cover over the identified waste areas. The area to be addressed by this alternative is the area where industrial waste was identified in the RI (URS, 2008a) as shown on Figure 4.

**Site P**

**Alternative P2:**

- **ASPHALT COVER OVER POTENTIALLY MOBILE SOURCE AREA (SA-P-3/AT-P-5)**
- **35 IAC 807 SOLID WASTE LANDFILL COVER OVER REMAINDER OF IDENTIFIED WASTE AREAS**
- **VAPOR INTRUSION MITIGATION**
- **INSTITUTIONAL AND ACCESS CONTROLS**

*Estimated Capital Cost: \$2,261,073*

*Estimated Present Worth O&M Cost: \$ 339,985*

*Estimated Present Worth Cost: \$2,601,058*

*Estimated Construction Timeframe: 5 to 8 years*

Institutional controls and engineered covers were described under “Common Elements” above. The additional component of Alternative P is described below. This alternative includes asphalt and 35 IAC 807 cover over the identified waste areas and institutional controls. The area to be addressed by this alternative is the area where industrial waste was identified in the RI (URS, 2008a) as shown on Figure 6.

**Vapor Intrusion Mitigation-** Vapor intrusion sampling during the RI and the subsequent risk analysis could not rule out the potential for risk due to exposure to vapors inside the nightclub. As part of the Site P remedial design, indoor air and/or sub slab sampling will be completed to further evaluate if a potential risk does exist. If the analysis indicates a potential risk does exist, a vapor control system would be designed and installed inside the nightclub as part of Alternative P4. Institutional controls will also be implemented to address vapor intrusion into any newly constructed buildings within the boundaries of the Site. Vapor intrusion would be addressed through an evaluation of each new building and vapor mitigation measures would be designed into the building to address any potential unacceptable risk.

**Alternative P3:**

- **NAPL COLLECTION AT WELL LEACH P-1**
- **ASPHALT COVER OVER POTENTIALLY MOBILE SOURCE AREA (SA-P-3/AT-P-5)**
- **35 IAC 807 SOLID WASTE LANDFILL COVER OVER REMAINDER OF IDENTIFIED WASTE AREAS**
- **VAPOR INTRUSION MITIGATION**
- **INSTITUTIONAL AND ACCESS CONTROLS**

*Estimated Capital Cost: \$2,301,873*

*Estimated Present Worth O&M Cost: \$602,455*

*Estimated Present Worth Cost: \$2,904,328*

*Estimated Construction Timeframe: 5 to 8 years*

Institutional controls and engineered covers were described under “Common Elements” above. Vapor intrusion migration was discussed under Alternative P2 above. The additional component of Alternative P3 is described below. This alternative includes the components of Alternative P2 above, and NAPL collection at well LEACH P-1, as described below.

**NAPL Collection at Well LEACH P-1-** The NAPL recovery well system for Site P will also include a pump and a collection and storage system to remove NAPL that accumulates in the well. Accumulated NAPL will be periodically removed from the storage system in compliance with state and federal regulations. The complete system and details of operation will be specified in the remedial design. The proposed endpoint for the NAPL recovery system will be when NAPL reaches an asymptotic rate of recovery based on

empirical recovery data.

**Alternative P4:**

- **RCRA SUBTITLE C DESIGNED COVER OVER IDENTIFIED WASTE AREAS**
- **VAPOR INTRUSION MITIGATION**
- **INSTITUTIONAL AND ACCESS CONTROLS**

*Estimated Capital Cost: \$4,706,692*

*Estimated Present Worth O&M Cost: \$450,890*

*Estimated Present Worth Cost: \$5,157,582*

*Estimated Construction Timeframe: 6 to 9 years*

Institutional controls and engineered covers were described under “Common Elements” above. Vapor intrusion migration was discussed under Alternative P2 above. This alternative includes RCRA subtitle C designed covers over the identified waste areas and institutional controls. The area to be addressed by this alternative is the area where industrial waste was identified in the RI (URS, 2008a) as shown on Figure 6.

**Site Q North**

**Alternative QN2:**

- **35 IAC 724 COMPLIANT CRUSHED ROCK COVER OVER DOGLEG AREA**
- **VAPOR INTRUSION MITIGATION**
- **INSTITUTIONAL AND ACCESS CONTROLS**

*Estimated Capital Cost: \$1,105,566*

*Estimated Present Worth O&M Cost: \$167,957*

*Estimated Present Worth Cost: \$1,273,523*

*Estimated Construction Timeframe: 5 to 8 years*

Institutional controls and engineered covers were described under “Common Elements” above. The additional component of Alternative QN2 is described below. This alternative includes a 35 IAC 724 crushed rock cover over the dogleg area as shown on Figure 7.

**Vapor Intrusion Mitigation-** Vapor intrusion sampling during the RI and the subsequent risk analysis could not rule out the potential for risk due to exposure to vapors inside the warehouse building. As part of the Site Q North remedial design, indoor air and/or sub slab sampling will be completed to further evaluate if a potential risk does exist. If the analysis indicates a potential risk does exist, a vapor control system would be designed and installed inside the warehouse building as part of Alternative QN2. Institutional controls will also be implemented to address vapor intrusion into any newly constructed buildings within the boundaries of the Site. Vapor intrusion would be addressed through an evaluation of each new building and vapor mitigation measures would be designed into the building to address any potential unacceptable risk.

**Alternative QN3:**

- **RCRA SUBTITLE C DESIGNED COVER OVER DOGLEG AREA**

- **VAPOR INTRUSION MITIGATION**
- **INSTITUTIONAL AND ACCESS CONTROLS**

*Estimated Capital Cost: \$12,265,471*

*Estimated Present Worth O&M Cost: \$547,881*

*Estimated Present Worth Cost: \$12,813,352*

*Estimated Construction Timeframe: 7 to 11 years*

Institutional controls and engineered covers were described under “Common Elements.” Vapor intrusion mitigation is described under Alternative QN2 above. This alternative includes a RCRA subtitle C designed cover over the dogleg area as shown on Figure 7.

**Alternative QN4:**

- **RCRA SUBTITLE C DESIGNED COVER OVER IDENTIFIED WASTE AREAS**
- **VAPOR INTRUSION MITIGATION**
- **INSTITUTIONAL AND ACCESS CONTROLS**

*Estimated Capital Cost: \$32,005,199*

*Estimated Present Worth O&M Cost: \$1,390,604*

*Estimated Present Worth Cost: \$33,395,803*

*Estimated Construction Timeframe: 10 to 14 years*

Institutional controls and engineered covers were described under “Common Elements.” Vapor intrusion mitigation is described under Alternative QN2 above. This alternative includes a RCRA subtitle C designed cover over the identified waste areas. The area to be addressed by this alternative is the area where industrial waste was identified in the RI (URS, 2008a) as shown on Figure 8.

**Alternative QN5:**

- **35 IAC 724 COMPLIANT CRUSHED ROCK COVER OVER IDENTIFIED WASTE AREAS**
- **VAPOR INTRUSION MITIGATION**
- **INSTITUTIONAL AND ACCESS CONTROLS**

*Estimated Capital Cost: \$2,705,015*

*Estimated Present Worth O&M Cost: \$344,010*

*Estimated Present Worth Cost: \$3,049,025*

*Estimated Construction Timeframe: 6 to 9 years*

Institutional controls and engineered covers were described under “Common Elements.” Vapor intrusion mitigation is described under Alternative QN2 above. This alternative includes a 35 IAC 724 compliant crushed rock cover over the identified waste areas. The area to be addressed by this alternative is the area where industrial waste was identified in the RI (URS, 2008a) as shown on Figure 8.

**Site Q Central**

**Alternative QC2:**

- **35 IAC 724 COMPLIANT CRUSHED ROCK COVER IDENTIFIED WASTE AREAS**

- **SHORELINE EROSION PROTECTION**
- **INSTITUTIONAL AND ACCESS CONTROLS**

*Estimated Capital Cost: \$1,847,826*

*Estimated Present Worth O&M Cost: \$228,451*

*Estimated Present Worth Cost: \$2,076,277*

*Estimated Construction Timeframe: 6 to 9 years*

Institutional controls and engineered covers were described under “Common Elements.” The additional component of Alternative QC2 is described below. This alternative includes a 35 IAC 724 compliant crushed rock cover over the identified waste areas. The area to be addressed by this alternative is the area where industrial waste was identified in the RI (URS, 2008a) as shown on Figure 9.

**Shoreline Erosion Protection-** Site Q Central encompasses approximately 1,500 feet of shoreline along the east bank of the Mississippi River. Approximately 1,000 feet of the shoreline has been covered with riprap to provide erosion protection. There is a segment of the shoreline located upstream of an existing barge ramp where the riprap is not as dense as other areas. A localized area near this segment experienced significant erosion during the 1993 flood event. The eroded area was repaired after the flood event. Alternative QC2 includes placement of additional riprap along portions of the shoreline upstream of the barge ramp to supplement the existing riprap to provide additional shoreline protection. The segment to receive additional riprap is estimated to be 470 feet long.

**Alternative QC3:**

- **SVE AT MOBILE SOURCE AREA (AT-Q32)**
- **35 IAC 724 COMPLIANT CRUSHED ROCK COVER IDENTIFIED WASTE AREAS**
- **SHORELINE EROSION PROTECTION**
- **INSTITUTIONAL AND ACCESS CONTROLS**

*Estimated Capital Cost: \$2,440,138*

*Estimated Present Worth O&M Cost: \$378,740*

*Estimated Present Worth Cost: \$2,818,878*

*Estimated Construction Timeframe: 6 to 9 years*

Institutional controls and engineered covers were described under “Common Elements.” Shoreline Erosion Protection is described under QC2 above. The additional component of Alternative QC3 is described below.

**SVE at Mobile Source Area (AT-Q32)-** This component includes a soil vapor extraction (SVE) system to address the potential mobile source area near the barge ramp (Figure 10).

The conceptual SVE system includes the following components: Pilot Test; A horizontal soil vapor extraction well; thermal oxidation unit with a propane fuel tank; vapor phase carbon adsorption system; liquid phase carbon adsorption system for knockout drum liquids; three vapor phase monitoring points; and O&M of the SVE system.

**Alternative QC4:**

- **RCRA SUBTITLE C DESIGNED COVER OVER IDENTIFIED WASTE AREAS**

- **SHORELINE EROSION PROTECTION**
- **INSTITUTIONAL AND ACCESS CONTROLS**

*Estimated Capital Cost: \$38,307,518*

*Estimated Present Worth O&M Cost: \$1,197,630*

*Estimated Present Worth Cost: \$39,505,148*

*Estimated Construction Timeframe: 10 to 15 years*

Institutional controls and engineered covers were described under “Common Elements.” Shoreline Erosion Protection is described under QC2 above. This alternative includes a RCRA subtitle C designed cover over the identified waste areas. The area to be addressed by this alternative is the area where industrial waste was identified in the RI (URS, 2008a) as shown on Figure 10.

#### **Site Q South**

##### **Alternative QS2:**

- **REMOVAL OF INTACT DRUMS AT AT-Q35**
- **35 IAC 724 COMPLIANT COVER OVER IDENTIFIED RISK AREAS**
- **INSTITUTIONAL AND ACCESS CONTROLS**

*Estimated Capital Cost: \$1,867,909*

*Estimated Present Worth O&M Cost: \$133,533*

*Estimated Present Worth Cost: \$2,001,442*

*Estimated Construction Timeframe: 5 to 8 years*

Institutional controls and engineered covers were described under “Common Elements.” The additional component of Alternative QS2 is described below. This alternative includes 35 IAC 724 compliant cover over identified risk areas as shown on Figure 11.

**Removal of Intact Drums at AT-Q35-** This alternative also includes removal of intact drums located in the previously excavated RI trench AT-Q-35. The location of this former trench will be identified and re-excavated to the same dimensions (e.g., length, width, depth) as previously excavated. Any intact drums identified within the trench will be removed, placed in over pack drums, and treated/disposed off-site per EPA and Illinois EPA regulations. If intact drums are visible in the trench, the trench will be expanded to remove them to a maximum dimension of 2,500 square feet. Following removal of any intact drums, the excavated area will be backfilled with the soil removed from the trench and clean soil, and appropriately covered.

##### **Alternative QS3:**

- **REMOVAL OF INTACT DRUMS AT AT-Q35**
- **35 IAC 724 COMPLIANT COVER OVER IDENTIFIED WASTE AREAS**
- **INSTITUTIONAL AND ACCESS CONTROLS**

*Estimated Capital Cost: \$4,295,070*

*Estimated Present Worth O&M Cost: \$199,537*

*Estimated Present Worth Cost: \$4,494,607*

*Estimated Construction Timeframe: 5 to 8 years*

Institutional controls and engineered covers were described under “Common Elements.” Removal of intact drums is described under QS2 above. This alternative includes 35 IAC 724 compliant soil cover over identified waste areas. The area to be addressed by this alternative is the area where industrial waste was identified in the RI (URS, 2008a) as shown on Figure 12.

**Alternative QS4:**

- **RCRA SUBTITLE C DESIGNED COVER OVER IDENTIFIED WASTE AREAS**
- **INSTITUTIONAL AND ACCESS CONTROLS**

*Estimated Capital Cost: \$8,412,720*

*Estimated Present Worth O&M Cost: \$323,894*

*Estimated Present Worth Cost: \$8,736,614*

*Estimated Construction Timeframe: 8 to 13 years*

Institutional controls and engineered covers were described under “Common Elements.” The additional component of Alternative QS4 is described below. This alternative includes RCRA subtitle C cover over identified waste areas. The area to be addressed by this alternative is the area where industrial waste was identified in the RI (URS, 2008a) as shown on Figure 12.

**Site R**

**Alternative R2:**

- **35 IAC 724 COMPLIANT SOIL COVER OVER ENTIRE SITE**
- **INSTITUTIONAL AND ACCESS CONTROLS**

*Estimated Capital Cost: \$1,697,019*

*Estimated Present Worth O&M Cost: \$312,999*

*Estimated Present Worth Cost: \$2,010,018*

*Estimated Construction Timeframe: 6 to 9 years*

Institutional controls and engineered covers were described under “Common Elements.” This alternative includes 35 IAC 724 compliant soil cover over the entire site as shown on Figure 13.

An engineered soil cover is currently present at Site R and is expected to meet the minimum 24-inch cover requirement over the entire area to be covered. However, a pre-design investigation will be required to document the thickness and condition of the existing soil cover. The objective of this pre-design is to ensure that a minimum of 2 feet of compacted clay soil exists over the former landfill area, not including the slurry wall spoils materials placed on top of Site R during the GMCS construction.

**Alternative R3:**

- **RCRA SUBTITLE C DESIGNED COVER OVER ENTIRE SITE**
- **INSTITUTIONAL AND ACCESS CONTROLS**

*Estimated Capital Cost: \$8,940,267*

*Estimated Present Worth O&M Cost: \$290,961*  
*Estimated Present Worth Cost: \$9,231,228*  
*Estimated Construction Timeframe: 8 to 11 years*

Institutional controls and engineered covers were described under “Common Elements.” This alternative includes a RCRA subtitle C cover over the entire sites as shown on Figure 13.

#### **Site S**

##### **Alternative S2:**

- **35 IAC 724 COMPLIANT SOIL COVER OVER ENTIRE SITE**
- **INSTITUTIONAL AND ACCESS CONTROLS**

*Estimated Capital Cost: \$232,134*  
*Estimated Present Worth O&M Cost: \$ 91,946*  
*Estimated Present Worth Cost: \$324,080*  
*Estimated Construction Timeframe: 4 to 7 years*

Institutional controls and engineered covers were described under “Common Elements.” This alternative includes 35 IAC 724 compliant soil cover over the entire site as shown on Figure 14.

##### **Alternative S3:**

- **IN-SITU TREATMENT OF POTENTIALLY MOBILE SOURCE AREAS**
- **35 IAC 724 COMPLIANT SOIL COVER OVER ENTIRE SITE**
- **INSTITUTIONAL AND ACCESS CONTROLS**

*Estimated Capital Cost: \$782,145*  
*Estimated Present Worth O&M Cost: \$242,891*  
*Estimated Present Worth Cost: \$1,025,036*  
*Estimated Construction Timeframe: 5 to 8 years*

Institutional controls and engineered covers were described under “Common Elements.” 35 IAC 724 Compliant Soil Cover is discussed under Alternative S2 above. The additional component of Alternative S3 is described below.

**In-situ Treatment of Potentially Mobile Source Areas-** The conceptual design of this SVE system at Site S is similar to the SVE system described for Alternative QC3 except that vertical extraction wells will be used rather than a horizontal extraction well. Design details for the SVE system will be based on pilot testing completed during the remedial design.

##### **Alternative S4:**

- **RCRA SUBTITLE C COVER OVER ENTIRE SITE**
- **INSTITUTIONAL AND ACCESS CONTROLS**

*Estimated Capital Cost: \$573,651*

*Estimated Present Worth O&M Cost: \$ 91,946*

*Estimated Present Worth Cost: \$665,597*

*Estimated Construction Timeframe: 5 to 9 years*

Institutional controls and engineered covers were described under “Common Elements.” This alternative includes RCRA Subtitle C cover over the entire site as shown on Figure 14.

## **VII. EVALUATION OF ALTERNATIVES**

Nine criteria are used to evaluate the different remediation alternatives individually and against each other in order to select a remedy. This section of the Proposed Plan profiles the relative performance of each alternative against the nine criteria, noting how it compares to the other options under consideration. The nine evaluation criteria are described below. The “Detailed Analysis of Alternatives” can be found in the Feasibility Study.

**Overall Protectiveness of Human Health and the Environment** determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.

**Compliance with ARARs** evaluates whether the alternative meets Federal and State environmental statutes, regulations and other requirements that pertain to the site, or whether a waiver is justified.

**Long-term Effectiveness and Permanence** considers the ability of an alternative to maintain protection of human health and the environment over time.

**Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment** evaluates an alternative’s use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.

**Short-term Effectiveness** considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.

**Implementability** considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.

**Cost** includes estimated capital and annual operation and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms with today’s dollar value. Cost estimates are expected to be accurate within a range of +50 and -30 percent.

**State/Support Agency Acceptance** considers whether the State agrees with EPA’s analysis and recommendations, as described in the Proposed Plan.

**Community Acceptance** considers whether the local community agrees with EPA’s analysis and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

## **A. COMPARISON OF ALTERNATIVES TO THE NINE CRITERIA**

The comparative analysis of the remedial alternatives is presented below.

### **1. Overall Protection of Human Health and the Environment**

This evaluation criterion assesses whether each remedial alternative protects human health and the environment. This assessment focuses on how an alternative achieves protection over time and indicates how each source of contamination would be minimized, reduced, or controlled through treatment, engineering, or institutional controls. The evaluation of the degree of overall protection associated with each alternative is based largely on the exposure pathways and scenarios set forth in the baseline human health risk assessment (HHRA).

The “No Action” Alternatives O1, P1, QN1, QC1, QS1, R1 and S1 are not protective of human health or the environment because they do not meet the RAOs developed for the affected soils and waste at Sites O, P, Q North, Q Central, Q South, R, or S, are not protective of human health and the environment, and do not comply with the ARARs identified for each site.

The analysis of each alternative with respect to overall protection of human health and the environment evaluates how the alternative reduces or eliminates both short- and long-term risk by controlling exposures to COCs to levels below which could result in risks to human health and the environment. All of the action alternatives for each of the SA2 Sites meet the overall protection of human health and the environment criteria.

Because Alternatives O1, P1, QN1, QC1, QS1, R1 and S1 are not protective of human health and the environment, they are eliminated from consideration under the remaining eight criteria.

### **2. Compliance with ARARs**

The engineered covers in Alternatives O2, QN2, QN5, QC2, QC3, QS2, QS3, R2, S2, and S3 all comply with 35 IAC 724's performance standards of functioning with minimal maintenance, promoting drainage, and minimizing erosion of the cap, and could accommodate settling and subsidence so that the cap's integrity is maintained. However, 35 IAC 724's performance standard for providing long-term minimization of migration of liquids (including the RCRA Subtitle C cap proposed in Alternatives O4, QN3, QN4, QC4, QS4, R3, and S4) is not appropriate for Sites O, P, Q North, Q Central, Q South and Site R because of the following:

- At Sites Q North, Q Central, Q South, R, the large fluctuations in groundwater levels resulting from the proximity to the river cause flushing effects that would not be addressed by a cover that minimizes infiltration;
- Groundwater data from the SHU at Sites O, P, Q Central indicates relatively minor impacts;
- No TCLP samples collected at Sites P and Q Central failed the TCLP limits indicative of leaching risk;

- Borings and test pit sampling indicates Sites P and Q Central are largely filled with non-hazardous municipal waste and construction debris;
- No principal threat liquids or mobile source materials were identified in the wastes above the water table at Sites O and Q Central; The area of principal threat material at Site Q South would be removed as part of the remedial alternative; and
- Impacted groundwater at Sauget Area 2 Sites (Site O, Site Q North, Site R, and Site S) is captured by the Sauget Area 2 Groundwater Migration Containment System.

All of the action alternatives will provide for the closure of the Sauget Area 2 landfills which either complies with or meets the substantive requirements of 35 IAC 724.410(b), which requires that the closure controls, minimizes, or eliminates to the extent necessary to adequately protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous decomposition products to the ground or surface or to the atmosphere and will comply with the ARARs related to PCB remediation wastes and the TSCA risk-based disposal method.

For Sites Q North, Q Central, Q South, and R the evaluation included an assessment of 17 IAC Sections 3704 and 3706 and 615 ILCS5/23. Because these Sites are within the floodway, construction projects are subject to various state and federal regulatory programs designed to minimize the impact of new construction on the flood carrying capacity of the Mississippi River. Illinois law and regulations prohibit certain fill activity in the floodway if such fill will impact flood-carrying capacity. As a result, RCRA Subtitle C covers over Site Q North, Site Q Central, Site Q South, and Site R are not expected to meet the threshold criteria for compliance with ARARs related to construction in the Mississippi River floodway due to the immense volume of fill and cover materials required to construct these covers.

### **3. Long-term Effectiveness and Permanence**

The evaluation of alternatives under this criterion addresses the results of a remedial action in terms of the risk remaining at the site after response objectives have been met. All of the alternatives, except No Action, provide some degree of long-term protection.

### **4. Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment**

This evaluation criterion addresses the statutory preference for selecting remedial actions that employ treatment technologies that reduce the toxicity, volume, or mobility of the hazardous constituents present in the impacted media.

Site O, Alternative O3 includes phytotechnology as a potential action to reduce the volume of constituents in Site O. However, after analysis, it was determined that not all Site O constituents are amenable to phytoremediation due to specific compounds in the waste material which are toxic to vegetation.

Site P, Alternative P3 includes the collection, removal, and treatment of NAPL at leachate well number Leach P-1.

Site Q Central, Alternative QC3 includes soil vapor extraction at a specific potential mobile source area. The SVE system would remove 5,000 to 8,000 pounds of chlorobenzene as well as an additional mass of 1,4 dichlorobenzene.

Site Q South, Alternatives QS2 and QS3 include the removal of intact drums at the AT-Q-35 location.

Site S, Alternative S3 includes soil vapor extraction over the entire Site. The SVE system would remove 62,000 to 99,000 pounds of VOCs from the soil.

Alternatives O3, P3, QC3, QS2, QS3 and S3 reduce the toxicity, volume, or mobility of the hazardous constituents present in the impacted media.

## **5. Short-term Effectiveness**

This evaluation criterion addresses the effects of the alternatives during the construction and implementation phases (i.e., remediation risks) until the RAOs are met.

Short-term risks associated with implementation of all of the action alternatives are typical of a construction project that involves construction of engineered covers. These risks include general risks to construction workers as well as risks to the community due to significant truck traffic needed to bring the large volume of fill and cover material to Sites O, P, Q, and R. Other risks include the potential for dust emissions or stormwater runoff from areas of affected soils or waste during construction of the covers.

The potential risks to the community due to dust emissions and stormwater runoff can be managed through measures that will be developed during remedial design. The potential risks to site workers during remedy implementation can be managed by requiring adequate personal protection equipment (PPE) and routine safety procedures that will be specified in a health and safety plan to be developed during remedial design.

## **6. Implementability**

All of the action alternatives could be implemented; however the RCRA Subtitle C covers would be extremely difficult to implement. Construction of RCRA Subtitle C covers would significantly impact current business operations in the areas of Site Q North and Site Q Central. These general areas are heavily used by multiple businesses and rely on movement of materials by rail, truck, and barge. For the RCRA Subtitle C covers over Site Q North, Site Q Central, Site Q South, and Site R, meeting the Illinois Department of Natural Resources requirements for filling in this area to accommodate the RCRA Subtitle C cover is not expected to be possible due to the lack of available land between the river and the levee from which to obtain borrow and meet a no net increase in flood potential in the area.

## **7. Cost**

Cost estimates for each Alternative are provided in Table 2 below.

## **8. State/Support Agency Acceptance**

The State of Illinois supports the Preferred Alternative.

## **9. Community Acceptance**

Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the ROD for the site.

Table 2 below summarizes the critical evaluation criteria for remedy analysis and selection.

**Table 2: Critical Evaluation Summary Table**

Alternative	Meets RAOs	Meets Threshold Evaluation Criteria		Time to Implement (Yrs)	Estimated 30-Year Present Worth Cost
		Overall Protection	Compliance with ARARS		
Alternative O1: No Action	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0	\$0
Alternative O2: 35 IAC 724 Compliant Soil Cover Over Identified Waste Areas and Institutional Controls	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	6 - 9	\$6.3M
Alternative O3: Phytotechnology in Potential Mobile Source Areas, 35 IAC 724 Compliant Soil Cover Over Remainder of Identified Waste Areas, and Institutional Controls	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	6 -9	\$5.8M
Alternative O4: RCRA Subtitle C Designed Cover Over Identified Waste Areas and Institutional Controls	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	7-11	\$16.2M
Alternative	Meets RAOs	Meets Threshold Evaluation Criteria		Estimated Time to Implement (Years)	Estimated 30-Year Present Worth Cost
		Overall Protection	Compliance with ARARS		
Alternative P1: No Action	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0	\$0
Alternative P2: Asphalt Cover Mobile Source Area (SA-P-3/AT-P-5), 35 IAC 807 Solid Waste Landfill Cover Over Remainder of Identified Waste Areas, and Institutional Controls	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	5 - 8	\$2.6M
Alternative P3: Asphalt Cover Mobile Source Area (SA-P-3/AT-P-5), 35 IAC 807 Solid Waste Landfill Cover Over Remainder of Identified Waste Areas, NAPL Collection Well (LEACH P-1), and Institutional Controls	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	5 -8	\$2.9M

Alternative	Meets RAOs	Meets Threshold Evaluation Criteria		Time to Implement (Yrs)	Estimated 30-Year Present Worth Cost
		Overall Protection	Compliance with ARARS		
Alternative P4: Asphalt Cover Mobile Source Area (SA-P-3/AT-P-5), RCRA Subtitle C Cover Over Remainder of Identified Waste Areas and Institutional Controls	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	6 - 9	\$5.2M
Alternative	Meets RAOs	Meets Threshold Evaluation Criteria		Estimated Time to Implement (Years)	Estimated 30-Year Present Worth Cost
		Overall Protection	Compliance with ARARS		
Alternative QN1: No Action	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0	\$0
Alternative QN2: 35 IAC 724 Compliant Crushed Rock Cover Over Dogleg Area, Vapor Intrusion Mitigation, and Institutional Controls Over Identified Waste Areas	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	5 - 8	\$1.3M
Alternative QN3: RCRA Subtitle C Designed Cover Over Dogleg Area, Vapor Intrusion Mitigation, and Institutional Controls Over Identified Waste Areas	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	7 - 11	\$12.8M
Alternative QN4: RCRA Subtitle C Designed Cover Over Identified Waste Areas, Vapor Intrusion Mitigation, and Institutional Controls Over Identified Waste Areas	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	10 - 14	\$33.4M
Alternative QN5: 35 IAC 724 Compliant Crushed Rock Cover Over Identified Waste Areas, Vapor Intrusion Mitigation, and Institutional Controls Over Identified Waste Areas	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	6 - 9	\$3.1M

Alternative	Meets RAOs	Meets Threshold Evaluation Criteria		Estimated Time to Implement (Years)	Estimated 30-Year Present Worth Cost
		Overall Protection	Compliance with ARARS		
Alternative QC1: No Action	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0	\$0
Alternative QC2: 35 IAC 724 Compliant Crushed Rock Cover Over Identified Waste Areas, Shoreline Erosion Protection, and Institutional Controls	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	6 - 9	\$2.1M
Alternative QC3: 35 IAC 724 Compliant Crushed Rock Cover Over Identified Waste Areas, Shoreline Erosion Protection, SVE at Mobile Source Area (AT-Q32), and Institutional Controls	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	6 - 9	\$2.8M
Alternative QC4: RCRA Subtitle C Designed Cover Over Identified Waste Areas, Shoreline Erosion Protection, and Institutional Controls	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	10 -15	\$39.5M
Alternative	Meets RAOs	Meets Threshold Evaluation Criteria		Estimated Time to Implement (Years)	Estimated 30-Year Present Worth Cost
		Overall Protection	Compliance with ARARS		
Alternative QS1: No Action	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0	\$0
Alternative QS2: 35 IAC 724 Compliant Cover Over Identified Risk Areas, Removal of Intact Drums at AT-Q35, and Institutional Controls	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	5-8	\$2.0M
Alternative QS3: 35 IAC 724 Compliant Cover Over Identified Waste Areas, Removal of Intact Drums at AT-Q35, and Institutional Controls	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	5 - 9	\$4.5M

Alternative	Meets RAOs	Meets Threshold Evaluation Criteria		Time to Implement (Yrs)	Estimated 30-Year Present Worth Cost
		Overall Protection	Compliance with ARARS		
Alternative QS4: RCRA Subtitle C Designed Over Identified Waste Areas, and Institutional Controls	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	8 -12	\$8.7M
Alternative R1: No Action	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0	\$0
Alternative R2: 35 IAC 724 Compliant Soil Cover Over Entire Site and Institutional Controls Over Entire Site	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	6 - 9	\$2.0M
Alternative R3: RCRA Subtitle C Designed Cover Over Entire Site and Institutional Controls Over Entire Site	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	8 - 11	\$9.2M
Alternative	Meets RAOs	Meets Threshold Evaluation Criteria		Estimated Time to Implement (Years)	Estimated 30-Year Present Worth Cost
		Overall Protection	Compliance with ARARS		
Alternative S1: No Action	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0	\$0
Alternative S2: 35 IAC 724 Compliant Soil Cover Over Entire Site and Institutional Controls Over Entire Site	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4 - 7	\$0.32M
Alternative S3: In-Situ Treatment (SVE) of Mobile Source Area, 35 IAC 724 Compliant Soil Cover Over Entire Site and Institutional Controls Over Entire Site	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	5 - 8	\$1.0M
Alternative S4: RCRA Subtitle C Designed Cover Over Entire Site and Institutional Controls Over Entire Site	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	5 - 9	\$0.67M

## **B. PRINCIPAL THREAT WASTES**

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site whenever practicable (NCP, 40 CFR Section 300.430(a)(1)(iii)(A)). The “principal threat” concept is applied to the characterization of “source materials” at a Superfund site. A source material is material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination to groundwater, surface water or air, or acts as a source for direct exposure. Contaminated groundwater generally is not considered to be a source material; however, Non-Aqueous Phase Liquids (NAPL) in groundwater may be viewed as source material. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained, or would present a significant risk to human health or the environment should exposure occur. The decision to treat these wastes is made on a site-specific basis through a detailed analysis of the alternatives using the nine remedy selection criteria. This analysis provides a basis for making a statutory finding that the remedy employs treatment as a principal element.

To protect human health and the environment, a combination of methods will be used to address the principal threat wastes observed at Site P, Q North, Q South, and R. Small quantities of principal threat wastes were observed in the following locations: Site P, NAPL observed in Anomaly Trench AT-P-4 and LEACH P-1; Site Q North, NAPL observed at Sonic-5 and LEACH-Q-1; Site Q South, two intact drums were found where potential NAPL leaked into the trench from the drums; and Site R, NAPL was observed at eight locations in Site R. Alternatives P3, QS2, and QS3 addresses the areas on Sites P and Q South by treating the recovered NAPL from Site P by off-site incineration and removal and off-site disposal of intact drums located on Site Q South. The principal threat waste identified on Site Q North and Site R are captured and treated by the Sauget Area 2 Groundwater Migration Control System<sup>4</sup>.

## **VIII. PREFERRED ALTERNATIVE**

The Preferred Alternatives for cleaning up the Sauget Area 2 Site are:

- Alternative O2: 35 IAC 724 Compliant Soil Cover Over Identified Waste Areas and Institutional Controls ;
- Alternative P3: Asphalt Cover over Potentially Mobile Source Area (SA-P-3/ AT-P-5), 35 IAC 807 Solid Waste Landfill Cover Over Remainder of Identified Waste Areas, NAPL Collection Well (LEACH P-1), and Institutional Controls;
- Alternative QN2: 35 IAC 724 Compliant Crushed Rock Cover Over Dogleg Area, Vapor Intrusion Mitigation, and Institutional Controls Over Identified Waste Areas;

---

<sup>4</sup> The installation of the Sauget Area 2 Groundwater Migration and Control System (GMCS) was required by EPA as an interim groundwater remedy for the Sauget Area 2 site. This system is comprised of a 3,300 ft long “U”-shaped, fully penetrating barrier wall located downgradient of Sauget Area 2, Site R, and Sauget Area 1, which extends from approximately 3 feet below ground surface to the top of bedrock and includes three groundwater extraction wells on the upgradient side of the barrier wall.

- Alternative QC3: 35 IAC 724 Compliant Crushed Rock Cover Over Identified Waste Areas, Shoreline Erosion Protection, SVE at Mobile Source Area (AT-Q32), and Institutional Controls;
- Alternative QS3: 35 IAC 724 Compliant Cover Over Identified Waste Areas, Removal of Intact Drums at AT-Q35, and Institutional Controls;
- Alternative R2: 35 IAC 724 Compliant Soil Cover Over Entire Site and Institutional Controls Over Entire Site; and
- Alternative S3: In-Situ Treatment (SVE) of Mobile Source Area, 35 IAC 724 Compliant Soil Cover Over Entire Site and Institutional Controls Over Entire Site.

The total cost of implementing the above actions in the Preferred Alternatives is \$20.8 million.

The Preferred Alternative was selected over other alternatives because it is expected to achieve substantial and long-term risk reduction through treatment, it is expected to prevent future exposure to currently contaminated soils and groundwater, and it is expected to allow the property to be used for the reasonably anticipated future land use, which is industrial. The Preferred Alternative also reduces the risk within a reasonable time frame at less cost and provides for long-term reliability of the remedy.

The State of Illinois concurs with selecting the Preferred Alternatives.

Based on the information available at this time, EPA and the State of Illinois expects the Preferred Alternatives to satisfy the following statutory requirements of CERCLA 121 (b): (1) be protective of human health and the environment; (2) comply with ARARs; (3) be cost effective; (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and (5) satisfy the preference for treatment as a principal element.

## **IX. Community Involvement**

EPA and Illinois EPA provide information regarding the clean-up of the Sauget Area 2 Site to the public through public meetings, the Administrative Record file for the Site, the Site Information Repository maintained at the Cahokia Public library, and announcements published in the *Belleville News-Democrat*. EPA and the State encourage the public to gain a more comprehensive understanding of the Site and the Superfund activities that have been conducted at the Site. The Preferred Alternative can change in response to public comment or new information.

The dates for the public comment period, the date, location, and time of the public meeting, and the locations of the Administrative Record files, are provided on the front page of this Proposed Plan.

Figure 1: Site Location

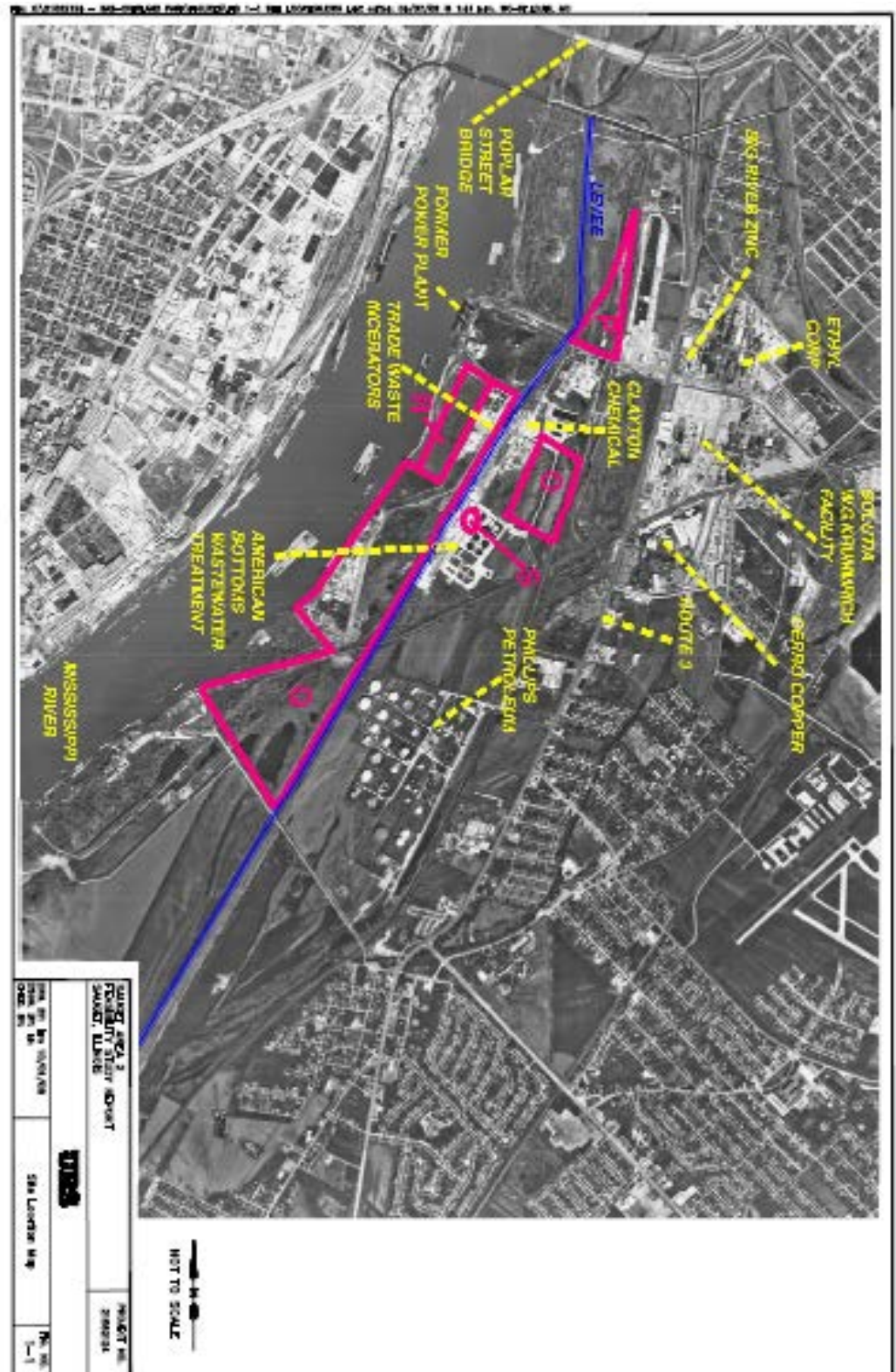


Figure 2: Sauget Area 2 Sites

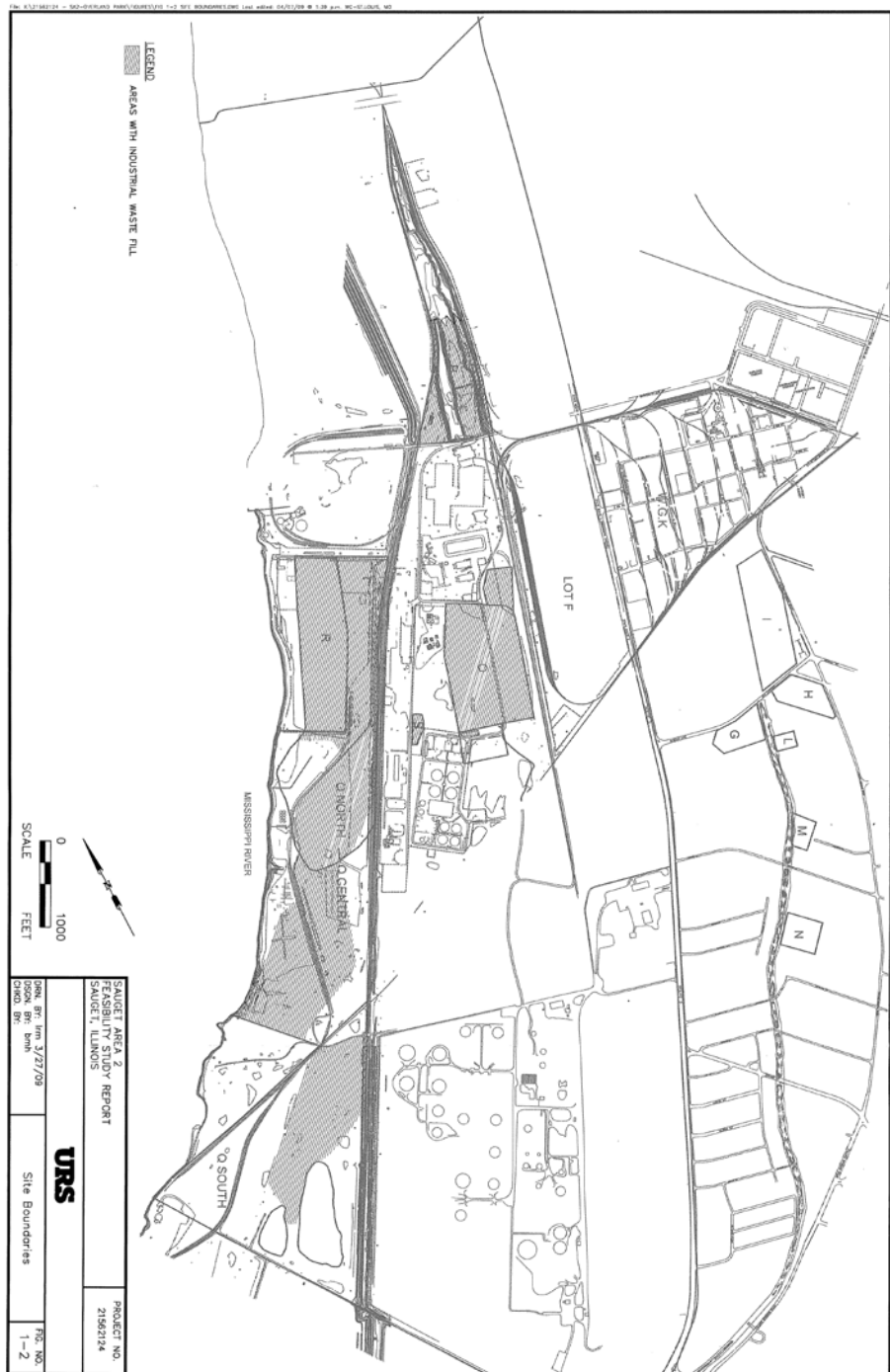
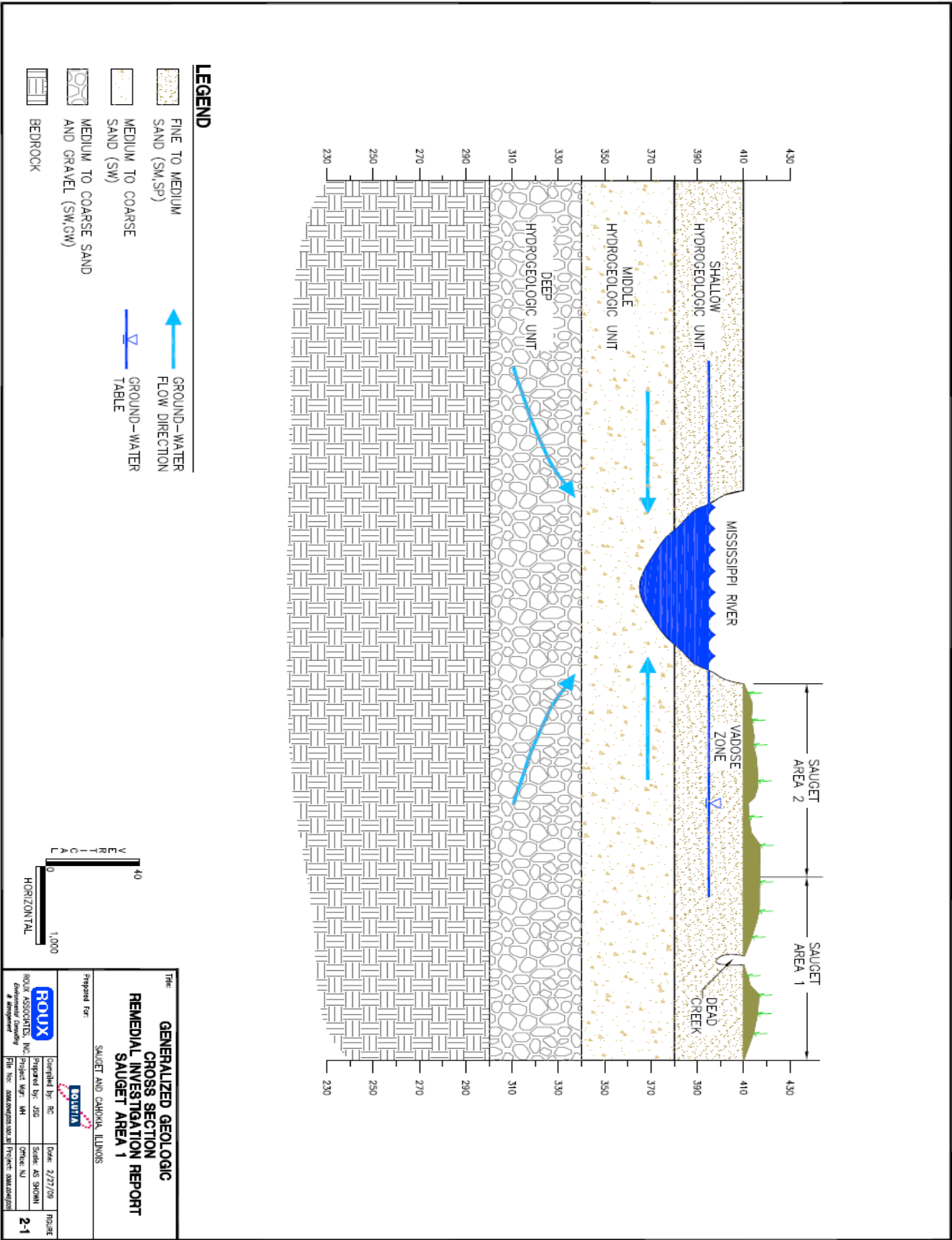


Figure 3: Generalized Geologic Cross Section



{ 46 }

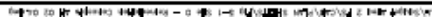
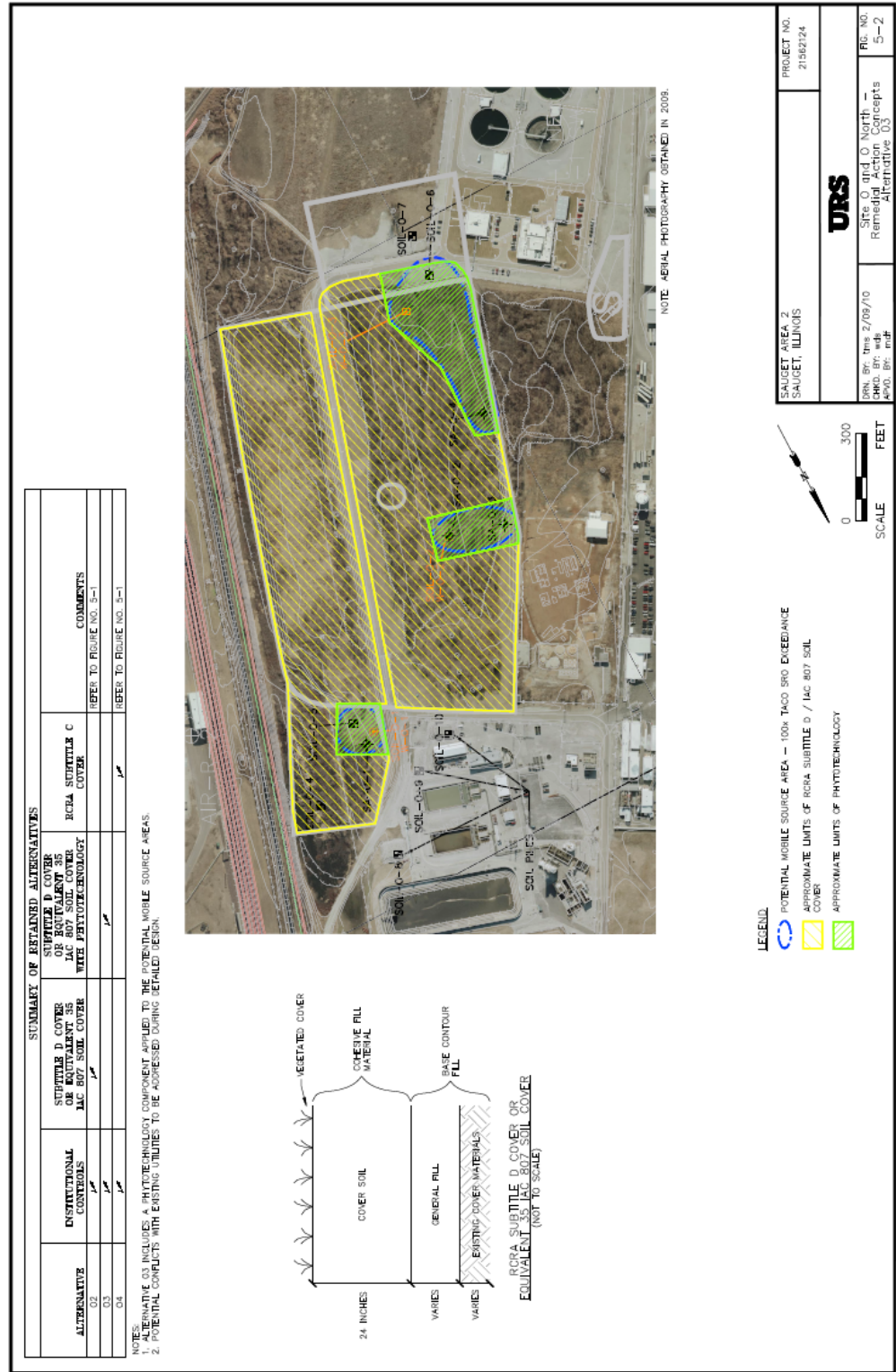


Figure 5: Site O: Alternative O3





[illegible]

**LEGEND**

- STRUCTURES TO BE REMOVED AND RELOCATED OR DEMOLISHED
- AREAS TO BE EXCAVATED
- AREAS TO BE FILL
- AREAS TO BE GRAVEL
- AREAS TO BE SAND
- AREAS TO BE CLAY
- AREAS TO BE ASPHALT
- AREAS TO BE CONCRETE
- AREAS TO BE OTHER

**CROSS-SECTION**

1.0 INCH GRADE  
2.0 INCH GRADE  
3.0 INCH GRADE  
4.0 INCH GRADE  
5.0 INCH GRADE  
6.0 INCH GRADE  
7.0 INCH GRADE  
8.0 INCH GRADE  
9.0 INCH GRADE  
10.0 INCH GRADE  
11.0 INCH GRADE  
12.0 INCH GRADE  
13.0 INCH GRADE  
14.0 INCH GRADE  
15.0 INCH GRADE  
16.0 INCH GRADE  
17.0 INCH GRADE  
18.0 INCH GRADE  
19.0 INCH GRADE  
20.0 INCH GRADE  
21.0 INCH GRADE  
22.0 INCH GRADE  
23.0 INCH GRADE  
24.0 INCH GRADE  
25.0 INCH GRADE  
26.0 INCH GRADE  
27.0 INCH GRADE  
28.0 INCH GRADE  
29.0 INCH GRADE  
30.0 INCH GRADE  
31.0 INCH GRADE  
32.0 INCH GRADE  
33.0 INCH GRADE  
34.0 INCH GRADE  
35.0 INCH GRADE  
36.0 INCH GRADE  
37.0 INCH GRADE  
38.0 INCH GRADE  
39.0 INCH GRADE  
40.0 INCH GRADE  
41.0 INCH GRADE  
42.0 INCH GRADE  
43.0 INCH GRADE  
44.0 INCH GRADE  
45.0 INCH GRADE  
46.0 INCH GRADE  
47.0 INCH GRADE  
48.0 INCH GRADE  
49.0 INCH GRADE  
50.0 INCH GRADE  
51.0 INCH GRADE  
52.0 INCH GRADE  
53.0 INCH GRADE  
54.0 INCH GRADE  
55.0 INCH GRADE  
56.0 INCH GRADE  
57.0 INCH GRADE  
58.0 INCH GRADE  
59.0 INCH GRADE  
60.0 INCH GRADE  
61.0 INCH GRADE  
62.0 INCH GRADE  
63.0 INCH GRADE  
64.0 INCH GRADE  
65.0 INCH GRADE  
66.0 INCH GRADE  
67.0 INCH GRADE  
68.0 INCH GRADE  
69.0 INCH GRADE  
70.0 INCH GRADE  
71.0 INCH GRADE  
72.0 INCH GRADE  
73.0 INCH GRADE  
74.0 INCH GRADE  
75.0 INCH GRADE  
76.0 INCH GRADE  
77.0 INCH GRADE  
78.0 INCH GRADE  
79.0 INCH GRADE  
80.0 INCH GRADE  
81.0 INCH GRADE  
82.0 INCH GRADE  
83.0 INCH GRADE  
84.0 INCH GRADE  
85.0 INCH GRADE  
86.0 INCH GRADE  
87.0 INCH GRADE  
88.0 INCH GRADE  
89.0 INCH GRADE  
90.0 INCH GRADE  
91.0 INCH GRADE  
92.0 INCH GRADE  
93.0 INCH GRADE  
94.0 INCH GRADE  
95.0 INCH GRADE  
96.0 INCH GRADE  
97.0 INCH GRADE  
98.0 INCH GRADE  
99.0 INCH GRADE  
100.0 INCH GRADE

**SAUCET, ILLINOIS**

**PROJECT NO. 21582124**

**DRS**

**Remedial Action Concepts**

**Alternative D1A**

**Site O North -**

**Remedial Action Concepts**

**Alternative D1A**

**Scale: 1" = 100'**

**North Arrow**

**Legend:**

- STRUCTURES TO BE REMOVED AND RELOCATED OR DEMOLISHED
- AREAS TO BE EXCAVATED
- AREAS TO BE FILL
- AREAS TO BE GRAVEL
- AREAS TO BE SAND
- AREAS TO BE CLAY
- AREAS TO BE ASPHALT
- AREAS TO BE CONCRETE
- AREAS TO BE OTHER

**Cross-Section:**

- 1.0 INCH GRADE
- 2.0 INCH GRADE
- 3.0 INCH GRADE
- 4.0 INCH GRADE
- 5.0 INCH GRADE
- 6.0 INCH GRADE
- 7.0 INCH GRADE
- 8.0 INCH GRADE
- 9.0 INCH GRADE
- 10.0 INCH GRADE
- 11.0 INCH GRADE
- 12.0 INCH GRADE
- 13.0 INCH GRADE
- 14.0 INCH GRADE
- 15.0 INCH GRADE
- 16.0 INCH GRADE
- 17.0 INCH GRADE
- 18.0 INCH GRADE
- 19.0 INCH GRADE
- 20.0 INCH GRADE
- 21.0 INCH GRADE
- 22.0 INCH GRADE
- 23.0 INCH GRADE
- 24.0 INCH GRADE
- 25.0 INCH GRADE
- 26.0 INCH GRADE
- 27.0 INCH GRADE
- 28.0 INCH GRADE
- 29.0 INCH GRADE
- 30.0 INCH GRADE
- 31.0 INCH GRADE
- 32.0 INCH GRADE
- 33.0 INCH GRADE
- 34.0 INCH GRADE
- 35.0 INCH GRADE
- 36.0 INCH GRADE
- 37.0 INCH GRADE
- 38.0 INCH GRADE
- 39.0 INCH GRADE
- 40.0 INCH GRADE
- 41.0 INCH GRADE
- 42.0 INCH GRADE
- 43.0 INCH GRADE
- 44.0 INCH GRADE
- 45.0 INCH GRADE
- 46.0 INCH GRADE
- 47.0 INCH GRADE
- 48.0 INCH GRADE
- 49.0 INCH GRADE
- 50.0 INCH GRADE
- 51.0 INCH GRADE
- 52.0 INCH GRADE
- 53.0 INCH GRADE
- 54.0 INCH GRADE
- 55.0 INCH GRADE
- 56.0 INCH GRADE
- 57.0 INCH GRADE
- 58.0 INCH GRADE
- 59.0 INCH GRADE
- 60.0 INCH GRADE
- 61.0 INCH GRADE
- 62.0 INCH GRADE
- 63.0 INCH GRADE
- 64.0 INCH GRADE
- 65.0 INCH GRADE
- 66.0 INCH GRADE
- 67.0 INCH GRADE
- 68.0 INCH GRADE
- 69.0 INCH GRADE
- 70.0 INCH GRADE
- 71.0 INCH GRADE
- 72.0 INCH GRADE
- 73.0 INCH GRADE
- 74.0 INCH GRADE
- 75.0 INCH GRADE
- 76.0 INCH GRADE
- 77.0 INCH GRADE
- 78.0 INCH GRADE
- 79.0 INCH GRADE
- 80.0 INCH GRADE
- 81.0 INCH GRADE
- 82.0 INCH GRADE
- 83.0 INCH GRADE
- 84.0 INCH GRADE
- 85.0 INCH GRADE
- 86.0 INCH GRADE
- 87.0 INCH GRADE
- 88.0 INCH GRADE
- 89.0 INCH GRADE
- 90.0 INCH GRADE
- 91.0 INCH GRADE
- 92.0 INCH GRADE
- 93.0 INCH GRADE
- 94.0 INCH GRADE
- 95.0 INCH GRADE
- 96.0 INCH GRADE
- 97.0 INCH GRADE
- 98.0 INCH GRADE
- 99.0 INCH GRADE
- 100.0 INCH GRADE



Figure 10: Site Q Central: Alternative QC4

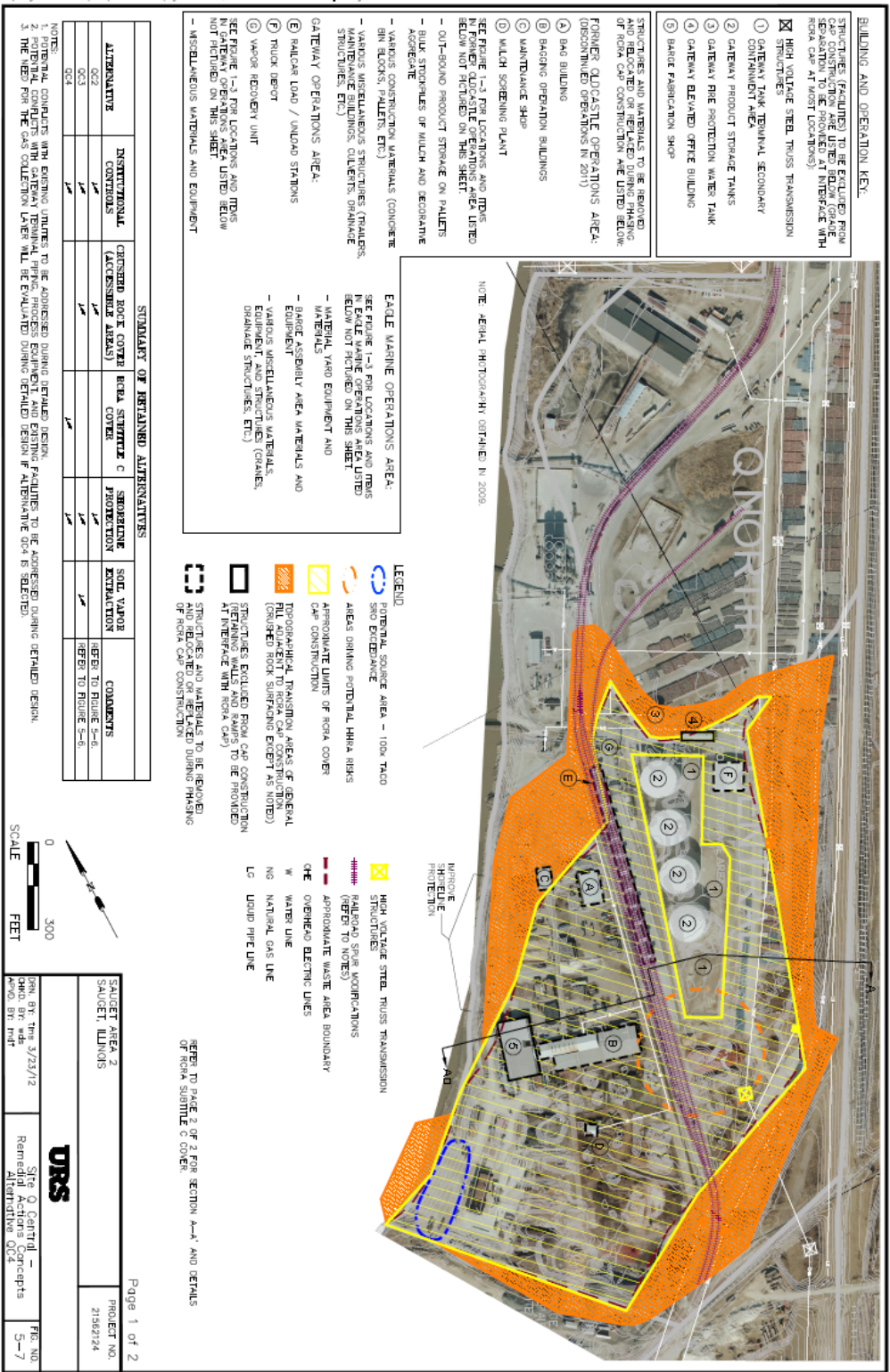
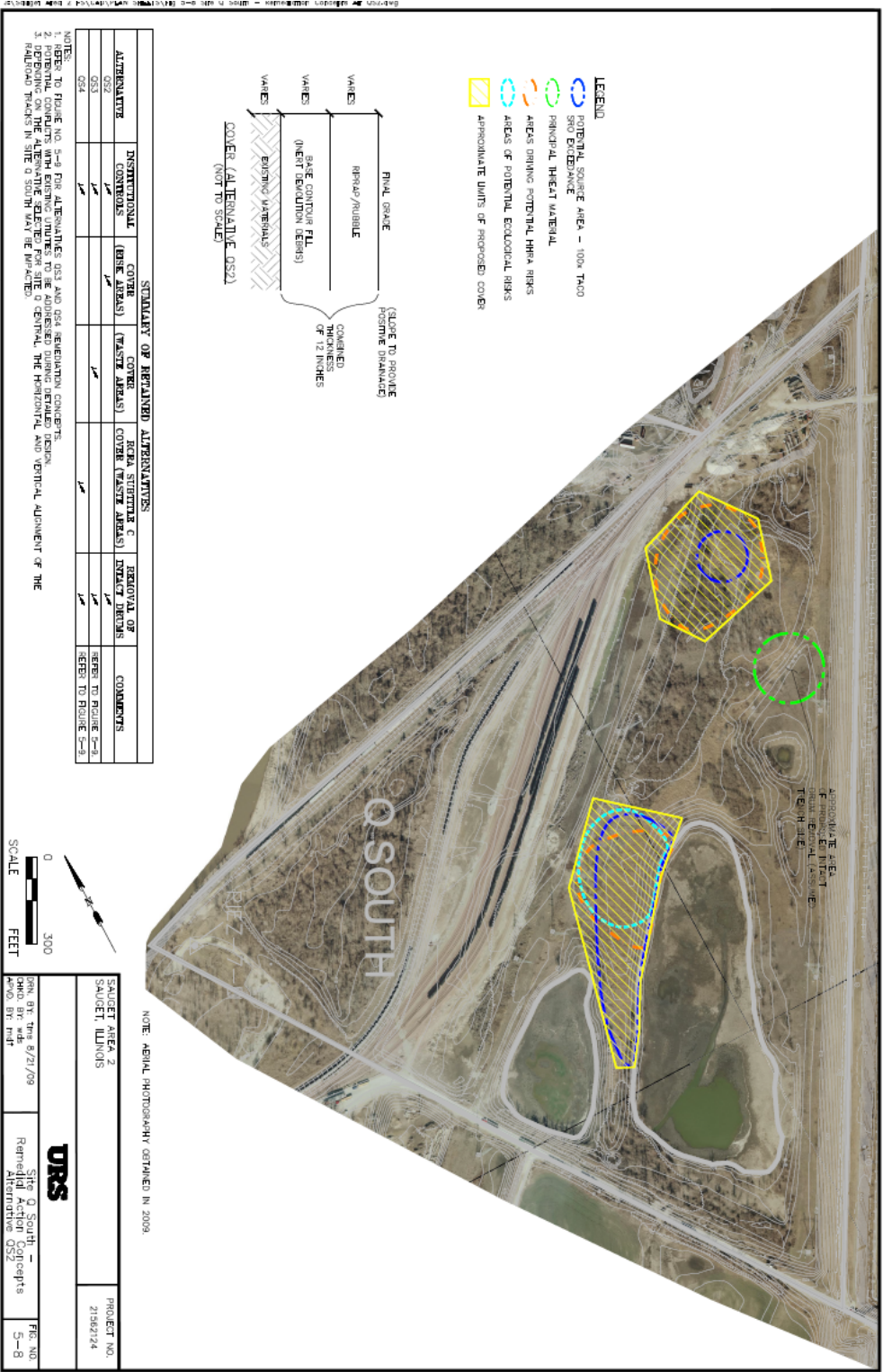


Figure 11: Site Q South: Alternative QS2





[ 55 ]



Figure 14: Site 2: Alternatives S2, S3, S4

